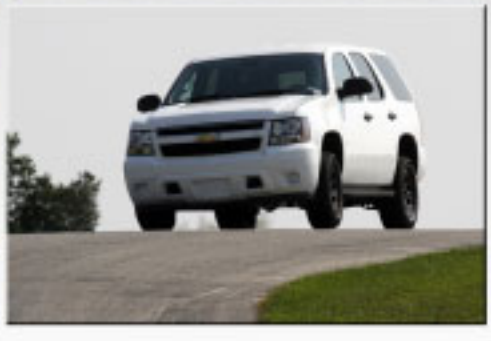
Police Vehicle Evaluation

Model Year 2009



STATE OF MICHIGAN
Department of State Police
and
Department of Management and Budget

2009 Model Year
Police Vehicle
Evaluation Program

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PREFACE

The Michigan State Police Vehicle Test Team is pleased to announce the results of the 2009 model year Police Vehicle Evaluation. This year we tested eight vehicles in total, and five motorcycles. We appreciate your continued support and encouragement. The vehicles evaluated this year included the following:

POLICE CATEGORY

Ford Police Interceptor (3.27:1)	4.6L
Ford Police Interceptor (3.55:1)	4.6L
Chevrolet Impala 9C1	3.9L
Chevrolet Impala 9C1 E85	3.9L
Chevrolet Tahoe PPV 2WD	5.3L
Chevrolet Tahoe PPV 2WD E85	5.3L
Dodge Charger	3.5L
Dodge Charger	5.7L

MOTORCYCLES

Harley Davidson Electra Glide FLHTP

Harley Davidson Road King FLHP

BMW Motorrad USA R1200RT-P

Buell Ulysses

BMW 650 XP

GENERAL INFORMATION

All of the cars were tested with a clean roof (no overhead light or lightbar) and without “A” pillar mount spotlights. We believe this is the best way to ensure all of the vehicles are tested on an equal basis. Remember that once overhead lights, spotlights, radio antennas, sirens, and other emergency equipment are installed, overall performance may be somewhat lower than we report.

Each vehicle was tested with the tires that are available as original equipment on the production model. Specific tire information for each vehicle is available in the Vehicle Description portion of this report. All vehicles listed in this report were equipped with electronic speed limiters.

Motorcycles were tested with equipment installed as provided by their respective manufacturer. Harley Davidson chose to test their bikes with minimal equipment. BMW chose to test their bike with the majority of the equipment installed. We will continue to refine the testing procedures with the motorcycle manufacturers and their participation.

Chrysler Proving Grounds - Acceleration, Top Speed, & Braking Tests

We had a full line up of test vehicles and we would like to thank the assistance we got from Mr. Craig Hageman from the Chrysler Proving Grounds. We appreciate the support we received from General Motors, Ford, Chrysler, Harley-Davidson and BMW during testing. This also was the third year of motorcycle testing and we continue to get great feedback on this important component to the testing lineup. We expect other manufacturers that produce law enforcement motorcycles to participate in the future.

Michigan State Police Precision Driving Unit- Motorcycle Dynamics

Sunday we completed the motorcycle dynamics testing with cool temperatures. This portion of the testing continues to grow. We had a larger audience of observers as well as a rider demo day for those that wanted to participate and take their turn at riding a police motorcycle.

Grattan Raceway - Vehicle Dynamics (High Speed Handling) Test

The weather was great and all the dynamics tests were completed. The vehicles were loaded up and returned to the Precision Driving Unit where they were made ready for the Ergonomics portion of the test.

We recommend you review the information contained in this report and then apply it to the needs of your agency. This report is not an endorsement of products, but a means of learning what’s available for your officers so they can do their job effectively and safely. If anything in this report requires further explanation or clarification, please call or write.

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ACKNOWLEGEMENTS

We would like to thank the following contributors. We are grateful for their support and encouragement toward our ultimate goal: a safe, successful testing program that benefits the law enforcement community nationwide and beyond.

Colonel Peter C. Munoz, Director, Michigan Department of State Police
Lt. Colonel Eddie Washington, Deputy Director, Field Services Bureau
Lt. Colonel Kriste K. Etue, Deputy Director, Administrative Services Bureau
Personnel from the Michigan Department of Management & Budget, Vehicle and Travel Services

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Mr. Sam Faasen and personnel from Grattan Raceway Park

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The Michigan State Police Rockford Post for their assistance at Grattan Raceway.

Michigan State Police Ergonomic Evaluators – Tpr. Greg Galarneau, MC Officer Niki Brehm, Tpr. Ernie Felkers, Tpr. Scott Carlson, Tpr. Derrick Jordan, Tpr. Todd Price, Tpr. Brett Vogt, Tpr. Mike Fink, Tpr. Bennie Boyd, and Tpr. Sarah Whitman

Special thanks to General Motors, Ford Motor Company, Chrysler Motors, Harley Davidson Motorcycle and BMW Motorrad USA for their hard work in building and preparing the test cars and motorcycles. We are grateful for your dedication to law enforcement. Everyday law enforcement looks to these vehicles to do a list of duties varied and enduring.

Finally, thanks to all in the United States and Canada who represent law enforcement and purchasing agencies for your constant encouragement and support. We are proud to make a contribution to the law enforcement community.

Michigan State Police Vehicle Test Team:

TEST EQUIPMENT

The following test equipment is utilized during the acceleration, top speed, braking, and vehicle dynamics portions of the evaluation program.

CORRSYS DATRON SENSOR SYSTEMS, INC., 40000 Grand River, Suite 503, Novi, MI 48375

DLS Smart Sensor – Optical non-contact speed and distance sensor

Correvit L-350 1 Axis Optical Sensor

Shoei Helmets, 3002 Dow Ave., Suite 128, Tustin, CA 92780

Law Enforcement Helmet – Model RJ-Air LE
Motorcycle Helmet – Multi Tech

AMB i.t. US INC., 1631 Phoenix Blvd., Suite 11, College Park, GA 30349

AMB TranX extended loop decoder

Mains adapter 230 V AC/12 V DC

AMB TranX260 transponders

AMMCO TOOLS, Inc., 2100 Commonwealth Ave., North Chicago, IL 60064

Decelerometer, Model 7350

TEST VEHICLE DESCRIPTIONS AND PHOTOGRAPHS

Ford Police Interceptor

3.27 4.6L SPFI

TEST VEHICLE DESCRIPTION

MAKE Ford	**MODEL** Police Interceptor		**SALES CODE NO.** P71		
ENGINE DISPLACEMENT	**CUBIC INCHES** 281		**LITERS** 4.6		
FUEL SYSTEM	Sequential Multiport Fuel Injection E85 Capable		**EXHAUST** Dual		
HORSEPOWER (SAE NET)	250 @ 5000 RPM		**ALTERNATOR** 200		
TORQUE	297ft-lbs @ 4000 RPM		**BATTERY** 750 CCA		
COMPRESSION RATIO	9.4:1				
TRANSMISSION	**MODEL** 4R70W	**TYPE** 4-Speed Electronic Automatic			
	LOCKUP TORQUE CONVERTER? Yes				
	OVERDRIVE? Yes				
AXLE RATIO	3.27				
STEERING	Power Rack and Pinion, variable ratio				
TURNING CIRCLE (CURB TO CURB)	40.3 ft.				
TIRE SIZE, LOAD & SPEED RATING	Goodyear Eagle RS-A P235/55R17 98W				
SUSPENSION TYPE (FRONT)	Independent SLA with ball joint & coil spring				
SUSPENSION TYPE (REAR)	4 bar link with Watts Linkage				
GROUND CLEARANCE, MINIMUM	5.6 in.	**LOCATION** Exhaust joint			
BRAKE SYSTEM	Power, dual front piston, single rear piston, 4 circuit and ABS				
BRAKES, FRONT	**TYPE** Vented disc		**SWEPT AREA** 273 sq. in.		
BRAKES, REAR	**TYPE** Vented disc		**SWEPT AREA** 176 sq. in.		
FUEL CAPACITY	**GALLONS** 19.0		**LITERS** 71.9		
GENERAL MEASUREMENTS	**WHEELBASE** 114.6 in.		**LENGTH** 212.0 in.		
	TEST WEIGHT 4098		**HEIGHT** 58.3 in.		
HEADROOM	**FRONT** 39.5 in.		**REAR** 37.8 in.		
LEGROOM	**FRONT** 41.6 in.		**REAR** 38.0 in.		
SHOULDER ROOM	**FRONT** 60.6 in.		**REAR** 60.0 in.		
HIPROOM	**FRONT** 57.4 in.		**REAR** 56.1 in.		
INTERIOR VOLUME	**FRONT** 57.6 cu. ft.		**REAR** 49.8 cu. ft.		
	COMB 107.5 cu. ft.		**TRUNK** 20.6 cu. ft.		
EPA MILEAGE EST. (MPG) Label	**CITY** 14	**HIGHWAY** 21	**COMBINED** 17		
EPA MILEAGE EST. (MPG) Unadjusted	**CITY** 17.9	**HIGHWAY** 29.7	**COMBINED** 21.7		
EPA MILEAGE EST. (MPG) Label E85	**CITY** 11	**HIGHWAY** 15	**COMBINED** 12		

Ford Police Interceptor

3.55 4.6L SPFI

TEST VEHICLE DESCRIPTION

MAKE Ford	**MODEL** Police Interceptor		**SALES CODE NO.** P71		
ENGINE DISPLACEMENT	**CUBIC INCHES** 281		**LITERS** 4.6		
FUEL SYSTEM	Sequential Multiport Fuel Injection E85 Capable		**EXHAUST** Dual		
HORSEPOWER (SAE NET)	250 @ 5000 RPM		**ALTERNATOR** 200		
TORQUE	297 ft-lbs @ 4000 RPM		**BATTERY** 750 CCA		
COMPRESSION RATIO	9.4:1				
TRANSMISSION	**MODEL** 4R70W	**TYPE** 4-Speed Electronic Automatic			
	LOCKUP TORQUE CONVERTER? Yes				
	OVERDRIVE? Yes				
AXLE RATIO	3.55				
STEERING	Power Rack and Pinion, variable ratio				
TURNING CIRCLE (CURB TO CURB)	40.3 ft.				
TIRE SIZE, LOAD & SPEED RATING	Goodyear Eagle RS-A P235/55R17 98W				
SUSPENSION TYPE (FRONT)	Independent SLA with ball joint & coil spring				
SUSPENSION TYPE (REAR)	4 bar link with Watts Linkage				
GROUND CLEARANCE, MINIMUM	5.6 in.	**LOCATION** Exhaust joint			
BRAKE SYSTEM	Power, dual front piston, single rear piston, 4 circuit and ABS				
BRAKES, FRONT	**TYPE** Vented disc		**SWEPT AREA** 273 sq. in.		
BRAKES, REAR	**TYPE** Vented disc		**SWEPT AREA** 176 sq. in.		
FUEL CAPACITY	**GALLONS** 19.0		**LITERS** 71.9		
GENERAL MEASUREMENTS	**WHEELBASE** 114.6 in.		**LENGTH** 212.0 in.		
	TEST WEIGHT 4075		**HEIGHT** 58.3 in.		
HEADROOM	**FRONT** 39.5 in.		**REAR** 37.8 in.		
LEGROOM	**FRONT** 41.6 in.		**REAR** 38.0 in.		
SHOULDER ROOM	**FRONT** 60.6 in.		**REAR** 60.0 in.		
HIPROOM	**FRONT** 57.4 in.		**REAR** 56.1 in.		
INTERIOR VOLUME	**FRONT** 57.6 cu. ft.		**REAR** 49.8 cu. ft.		
	COMB 107.5 cu. ft.		**TRUNK** 20.6 cu. ft.		
EPA MILEAGE EST. (MPG) Label	**CITY** 14	**HIGHWAY** 21	**COMBINED** 17		
EPA MILEAGE EST. (MPG) Unadjusted	**CITY** 17.9	**HIGHWAY** 29.7	**COMBINED** 21.7		


Chevrolet Impala
9C1 3.9L SPFI
IMPALA
022MD87
022MD87

TEST VEHICLE DESCRIPTION

MAKE Chevrolet	**MODEL** Impala 9C1		**SALES CODE NO.** 1WS19		
ENGINE DISPLACEMENT	**CUBIC INCHES** 237		**LITERS** 3.9		
FUEL SYSTEM	Sequential Port Fuel Injection E85 Capable		**EXHAUST** Single		
HORSEPOWER (SAE NET)	233 @ 5600 RPM		**ALTERNATOR** 150 amp.		
TORQUE	240 ft-lbs @ 4000 RPM		**BATTERY** 750 CCA		
COMPRESSION RATIO	9.4:1				
TRANSMISSION	**MODEL** 4T65E	**TYPE** 4-Speed Automatic			
	LOCKUP TORQUE CONVERTER? Yes				
	OVERDRIVE? Yes				
AXLE RATIO	3.29:1				
STEERING	Power Rack and Pinion				
TURNING CIRCLE (CURB TO CURB)	38.0 ft.				
TIRE SIZE, LOAD & SPEED RATING	Pirelli P6, P225/60 R16 97V				
SUSPENSION TYPE (FRONT)	Independent McPherson strut, coil springs & stabilizer bar				
SUSPENSION TYPE (REAR)	Independent Tri-Link coil spring over strut & stabilizer bar				
GROUND CLEARANCE, MINIMUM	7.1 in.	**LOCATION** Engine cradle			
BRAKE SYSTEM	Power, dual hydraulic, anti-lock				
BRAKES, FRONT	**TYPE** Vented disc		**SWEPT AREA** 235.4 sq. in.		
BRAKES, REAR	**TYPE** Solid disc		**SWEPT AREA** 160.3 sq. in.		
FUEL CAPACITY	**GALLONS** 17.0		**LITERS** 64.3		
GENERAL MEASUREMENTS	**WHEELBASE** 110.5 in.		**LENGTH** 200.4 in.		
	TEST WEIGHT 3653		**HEIGHT** 58.7 in.		
HEADROOM	**FRONT** 39.4 in.		**REAR** 37.8 in.		
LEGROOM	**FRONT** 42.3 in.		**REAR** 37.6 in.		
SHOULDER ROOM	**FRONT** 58.7 in.		**REAR** 58.6 in.		
HIPROOM	**FRONT** 56.4 in.		**REAR** 57.2 in.		
INTERIOR VOLUME	**FRONT** 56.5 cu. ft.		**REAR** 55.7 cu. ft.		
	COMB 104.8 cu. ft.		**TRUNK** 18.6 cu. ft. w/ compact spare		
EPA MILEAGE EST. (MPG) Label	**CITY** 17	**HIGHWAY** 24	**COMBINED** 20		
EPA MILEAGE EST. (MPG) Unadjusted	**CITY** 21.2	**HIGHWAY** 33.8	**COMBINED** 25.5		
EPA Mileage EST (MPG) Label E85	**CITY** 12	**HIGHWAY** 18	**COMBINED** 15		
EPA Mileage EST (MPG) Unadjusted E85	**CITY** 15.5	**HIGHWAY** 24.7	**COMBINED** 18.6		


Chevrolet Tahoe
PPV 2WD

VEHICLE TEST DESCRIPTION

MAKE Chevrolet	**MODEL** Tahoe PPV – 2WD		**SALES CODE NO.** CC10706		
ENGINE DISPLACEMENT	**CUBIC INCHES** 327		**LITERS** 5.3		
FUEL SYSTEM	Sequential Port Fuel Injection E85 Capable		**EXHAUST** Single		
HORSEPOWER (SAE NET)	320 @ 5200 RPM		**ALTERNATOR** 160		
TORQUE	340 ft-lbs @ 4000 RPM		**BATTERY** 730 CCA		
COMPRESSION RATIO	9.5:1				
TRANSMISSION	**MODEL** 4L60E	**TYPE** 4 – Speed Automatic Overdrive			
	LOCKUP TORQUE CONVERTER? Yes				
	OVERDRIVE? Yes				
AXLE RATIO	3.73				
STEERING	Power – Rack & Pinion				
TURNING CIRCLE (CURB TO CURB)	39.0 ft.				
TIRE SIZE, LOAD & SPEED RATING	Goodyear Eagle RS-A P265/60R17 108H				
SUSPENSION TYPE (FRONT)	Independent, single coil over shock with stabilizer bar				
SUSPENSION TYPE (REAR)	Multi-link with coil springs				
GROUND CLEARANCE, MINIMUM	8.00 in.	**LOCATION** Rear axle			
BRAKE SYSTEM	Vacuum-boost, power, anti-lock				
BRAKES, FRONT	**TYPE** Disc		**SWEPT AREA** 213 sq. in.		
BRAKES, REAR	**TYPE** Disc		**SWEPT AREA** 133 sq. in.		
FUEL CAPACITY	**GALLONS** 26.0		**LITERS** 98.4		
GENERAL MEASUREMENTS	**WHEELBASE** 116.0 in.		**LENGTH** 202.0 in.		
	TEST WEIGHT 5274		**HEIGHT** 73.9		
HEADROOM	**FRONT** 40.3 in.		**REAR** 39.2 in.		
LEGROOM	**FRONT** 41.3 in.		**REAR** 39.0 in.		
SHOULDER ROOM	**FRONT** 65.3 in.		**REAR** 65.2 in.		
HIPROOM	**FRONT** 64.4 in.		**REAR** 60.6 in.		
INTERIOR VOLUME ***MAX. CARGO IS W/REAR SEATS FOLDED DOWN**	**FRONT** 62.9 cu. ft.		**REAR** 57.68 cu. ft.		
	COMB 120.58 cu. ft.		***MAX. CARGO** 108.9 cu. ft.		
EPA MILEAGE EST. (MPG) Label	**CITY** 14	**HIGHWAY** 19	**COMBINED** 16		
EPA MILEAGE EST. (MPG) Unadjusted	**CITY** 17.3	**HIGHWAY** 26.3	**COMBINED** 20.4		
EPA MILEAGE EST. (MPG) E85 Label	**CITY** 10	**HIGHWAY** 13	**COMBINED** 11		
EPA MILEAGE EST. (MPG) E85 Unadjusted	**CITY** 12.7	**HIGHWAY** 18.6	**COMBINED** 14.8		


Dodge Charger
3.5L SPFI
BAU 1871
BAU 1871

TEST VEHICLE DESCRIPTION

MAKE Dodge	**MODEL** Charger	**SALES CODE NO.** 27A	
ENGINE DISPLACEMENT	**CUBIC INCHES** 214	**LITERS** 3.5	
FUEL SYSTEM	Sequential Port Fuel Injection	**EXHAUST** Single	
HORSEPOWER (SAE NET)	250 @ 6400	**ALTERNATOR** 160 Amp	
TORQUE	250 ft-lbs @ 3800	**BATTERY** 800 CCA	
COMPRESSION RATIO	10.0:1		
TRANSMISSION	**MODEL** A580	**TYPE** 5 Speed Electronic Automatic	
	LOCKUP TORQUE CONVERTER? Yes		
	OVERDRIVE? Yes		
AXLE RATIO	2.87:1		
STEERING	Power Rack & Pinion		
TURNING CIRCLE (CURB TO CURB)	38.9		
TIRE SIZE, LOAD & SPEED RATING	Continental ContiProContact P225/60 R 18 99V		
SUSPENSION TYPE (FRONT)	Independent High Arm SLA with Dual Ball Joint Lower, Coil Spring, Sway Bar		
SUSPENSION TYPE (REAR)	Independent Multi-Link, Coil Spring, Sway Bar		
GROUND CLEARANCE, MINIMUM	5.2 in.	**LOCATION** Fascia Belly Pan	
BRAKE SYSTEM	Power, Dual Piston Front/Single Piston Rear, Anti-Lock		
BRAKES, FRONT	**TYPE** Vented Disc	**SWEPT AREA** 282 sq. in.	
BRAKES, REAR	**TYPE** Vented Disc	**SWEPT AREA** 242 sq. in.	
FUEL CAPACITY	**GALLONS** 19	**LITERS** 72	
GENERAL MEASUREMENTS	**WHEELBASE** 120 in.	**LENGTH** 200.1 in.	
	TEST WEIGHT 3829	**HEIGHT** 58.2 in.	
HEADROOM	**FRONT** 38.7 in.	**REAR** 36.2 in.	
LEGROOM	**FRONT** 41.8 in.	**REAR** 40.2 in.	
SHOULDER ROOM	**FRONT** 59.3 in.	**REAR** 57.6 in.	
HIPROOM	**FRONT** 56.2 in.	**REAR** 55.5 in.	
INTERIOR VOLUME	**FRONT** 55.5 cu. ft.	**REAR** 48.5 cu. ft.	
	COMB 104 cu. ft.	**TRUNK** 16.2 cu. ft.	
EPA MILEAGE EST. (MPG) Label	**CITY** 16	**HIGHWAY** 25	**COMBINED** 19
EPA MILEAGE EST. (MPG) Unadjusted	**CITY** 20.9	**HIGHWAY** 34.1	**COMBINED** 25.3

Dodge Charger
5.7L SPFI

TEST VEHICLE DESCRIPTION

MAKE Dodge	**MODEL** Charger		**SALES CODE NO.** 29A		
ENGINE DISPLACEMENT	**CUBIC INCHES** 345		**LITERS** 5.7		
FUEL SYSTEM	Sequential Port Fuel Injection		**EXHAUST** Dual		
HORSEPOWER (SAE NET)	368 @ 5200		**ALTERNATOR** 160 Amp		
TORQUE	391 ft-lbs @ 4150		**BATTERY** 800 CCA		
COMPRESSION RATIO	10.5:1				
TRANSMISSION	**MODEL** A580	**TYPE** 5 Speed Electronic Automatic			
	LOCKUP TORQUE CONVERTER? Yes				
	OVERDRIVE? Yes				
AXLE RATIO	2.65:1				
STEERING	Power Rack & Pinion				
TURNING CIRCLE (CURB TO CURB)	38.9				
TIRE SIZE, LOAD & SPEED RATING	Continental ContiProContact P225/60 R 18 99V				
SUSPENSION TYPE (FRONT)	Independent High Arm SLA with Dual Ball Joint Lower, Coil Spring, Sway Bar				
SUSPENSION TYPE (REAR)	Independent Multi-Link, Coil Spring, Sway Bar				
GROUND CLEARANCE, MINIMUM	5.2 in.	**LOCATION** Fascia Belly Pan			
BRAKE SYSTEM	Power, Dual Piston Front/Single Piston Rear, Anti-Lock				
BRAKES, FRONT	**TYPE** Vented Disc		**SWEPT AREA** 282 sq. in.		
BRAKES, REAR	**TYPE** Vented Disc		**SWEPT AREA** 242 sq. in.		
FUEL CAPACITY	**GALLONS** 19		**LITERS** 72		
GENERAL MEASUREMENTS	**WHEELBASE** 120 in.		**LENGTH** 200.1 in.		
	TEST WEIGHT 4040		**HEIGHT** 58.2 in.		
HEADROOM	**FRONT** 38.7 in.		**REAR** 36.2 in.		
LEGROOM	**FRONT** 41.8 in.		**REAR** 40.2 in.		
SHOULDER ROOM	**FRONT** 59.3 in.		**REAR** 57.6 in.		
HIPROOM	**FRONT** 56.2 in.		**REAR** 55.5 in.		
INTERIOR VOLUME	**FRONT** 55.5 cu. ft.		**REAR** 48.5 cu. ft.		
	COMB 104 cu. ft.		**TRUNK** 16.2 cu. ft.		
EPA MILEAGE EST. (MPG) Label	**CITY** 16	**HIGHWAY** 25	**COMBINED** 19		
EPA MILEAGE EST. (MPG) Unadjusted	**CITY** 19.3	**HIGHWAY** 34.6	**COMBINED** 24.1		

TEST VEHICLE DESCRIPTION SUMMARY

	Ford Police Interceptor 3.27		Chevrolet Impala 9C1		Dodge Charger 3.5L
ENGINE DISPLACEMENT – CU. IN.	281		237		214
ENGINE DISPLACEMENT – LITERS	4.6		3.9		3.5
ENGINE FUEL SYSTEM	SMFI		SPFI		SPFI
HORSEPOWER (SAE NET)	250		233		250
TORQUE (FT. LBS.)	297		240		250
COMPRESSION RATIO	9.4:1		9.4:1		10.0:1
AXLE RATIO	3.27		3.29:1		2.87:1
TURNING CIRCLE – FT. CURB TO CURB	40.3		38.0		38.9
TRANSMISSION	4 Speed elec. auto		4 Speed auto		5 Speed elec. auto
TRANSMISSION MODEL NUMBER	4R70W		4T65E		A580
LOCKUP TORQUE CONVERTER	Yes		Yes		Yes
TRANSMISSION OVERDRIVE	Yes		Yes		Yes
TIRE SIZE	P235/55R		P225/60R		P225/60R
WHEEL RIM SIZE – INCHES	17		16		18
GROUND CLEARANCE – INCHES	5.6		7.1		5.2
BRAKE SYSTEM	Power, ABS		Power, ABS		Power, ABS
BRAKES – FRONT TYPE	Vented Disc		Vented Disc		Vented Disc
BRAKES – REAR TYPE	Vented Disc		Solid Disc		Vented Disc
FUEL CAPACITY – GALLONS	19		17		19
FUEL CAPACITY – LITERS	71.9		64.3		72
OVERALL LENGTH – INCHES	212.0		200.4		200.1
OVERALL HEIGHT – INCHES	58.3		58.7		58.2
TEST WEIGHT – LBS.	4098		3653		3829
WHEELBASE – INCHES	114.6		110.5		120
HEADROOM FRONT – INCHES	39.5		39.4		38.7
HEADROOM REAR – INCHES	37.8		37.8		36.2
LEGROOM FRONT – INCHES	41.6		42.3		41.8
LEGROOM REAR – INCHES	38.0		37.6		40.2
SHOULDER ROOM FRONT – INCHES	60.6		58.7		59.3
SHOULDER ROOM REAR – INCHES	60.0		58.6		57.6
HIPROOM FRONT – INCHES	57.4		56.4		56.2
HIPROOM REAR – INCHES	56.1		57.2		55.5
INTERIOR VOLUME FRONT – CU. FT.	57.6		56.5		55.5
INTERIOR VOLUME REAR – CU. FT.	49.8		55.7		48.5
INTERIOR VOLUME COMB. – CU. FT.	107.5		104.8		104
TRUNK VOLUME – CU. FT.	20.6		18.6		16.2
	Gas	**E85**	**Gas**	**E-85**	**Gas**
EPA MILEAGE – CITY – MPG Label	14	11	17	12	16
EPA MILEAGE – CITY – MPG Unadjusted	17.9		21.2	15.5	20.9
EPA MILEAGE – HIGHWAY – MPG Label	21	15	24	18	25
EPA MILEAGE – HIGHWAY – MPG Unadjusted	29.7		33.8	24.7	34.1
EPA MILEAGE – COMBINED – MPG Label	17	12	20	15	19
EPA MILEAGE – COMBINED – MPG Unadjusted	21.7		25.5	18.6	25.3

TEST VEHICLE DESCRIPTION SUMMARY

	Dodge Charger 5.7L	Ford Police Interceptor 3.55	Chevrolet Tahoe PPV	
ENGINE DISPLACEMENT – CU. IN.	345	281	327	
ENGINE DISPLACEMENT – LITERS	5.7	4.6	5.3	
ENGINE FUEL SYSTEM	SPFI	SMFI	SPFI	
HORSEPOWER (SAE NET)	368	250	320	
TORQUE (FT. LBS.)	391	297	340	
COMPRESSION RATIO	10.5:1	9.4:1	9.5:1	
AXLE RATIO	2.65:1	3.55	3.73	
TURNING CIRCLE – FT. CURB TO CURB	38.9	40.3	39.0	
TRANSMISSION	5 Speed elec. auto	4 Speed elec. auto	4-Speed Automatic Overdrive	
TRANSMISSION MODEL NUMBER	A580	4R70W	4L60E	
LOCKUP TORQUE CONVERTER	Yes	Yes	Yes	
TRANSMISSION OVERDRIVE	Yes	Yes	Yes	
TIRE SIZE	P225/60R	P235/55R	P265/60R	
WHEEL RIM SIZE – INCHES	18	17	17	
GROUND CLEARANCE – INCHES	5.2	5.6	8.00	
BRAKE SYSTEM	Power, ABS	Power, ABS	Power, ABS	
BRAKES – FRONT TYPE	Vented Disc	Vented Disc	Disc	
BRAKES – REAR TYPE	Vented Disc	Vented Disc	Disc	
FUEL CAPACITY – GALLONS	19	19	26	
FUEL CAPACITY – LITERS	72	71.9	98.4	
OVERALL LENGTH – INCHES	200.1	212.0	202.0	
OVERALL HEIGHT – INCHES	58.2	58.3	73.9	
TEST WEIGHT – LBS.	4040	4075	5274	
WHEELBASE – INCHES	120	114.6	116	
HEADROOM FRONT – INCHES	38.7	39.5	40.3	
HEADROOM REAR – INCHES	36.2	37.8	39.2	
LEGROOM FRONT – INCHES	41.8	41.6	41.3	
LEGROOM REAR – INCHES	40.2	38.0	39.0	
SHOULDER ROOM FRONT – INCHES	59.3	60.6	65.3	
SHOULDER ROOM REAR – INCHES	57.6	60.0	65.2	
HIPROOM FRONT – INCHES	56.2	57.4	64.4	
HIPROOM REAR – INCHES	55.5	56.1	60.6	
INTERIOR VOLUME FRONT – CU. FT.	55.5	57.6	62.9	
INTERIOR VOLUME REAR – CU. FT.	48.5	49.8	57.68	
INTERIOR VOLUME COMB. – CU. FT.	104	107.5	120.58	
TRUNK VOLUME – CU. FT.	16.2	20.6	108.9	
	Gas	**Gas**	**Gas**	**E85**
EPA MILEAGE – CITY – MPG- Label	16	14	14	10
EPA MILEAGE CITY – MPG - Unadjusted	19.3	17.9	17.3	12.7
EPA MILEAGE – HIGHWAY – MPG - Label	25	21	19	13
.EPA MILEAGE – HIGHWAY – MPG - Unadjusted	34.6	29.7	26.3	18.6
EPA MILEAGE – COMBINED – MPG - Label	19	17	16	11
EPA MILEAGE – COMBINED – MPG Unadjusted	24.1	21.7	20.4	14.8

VEHICLE DYNAMICS TESTING

TEST OBJECTIVE

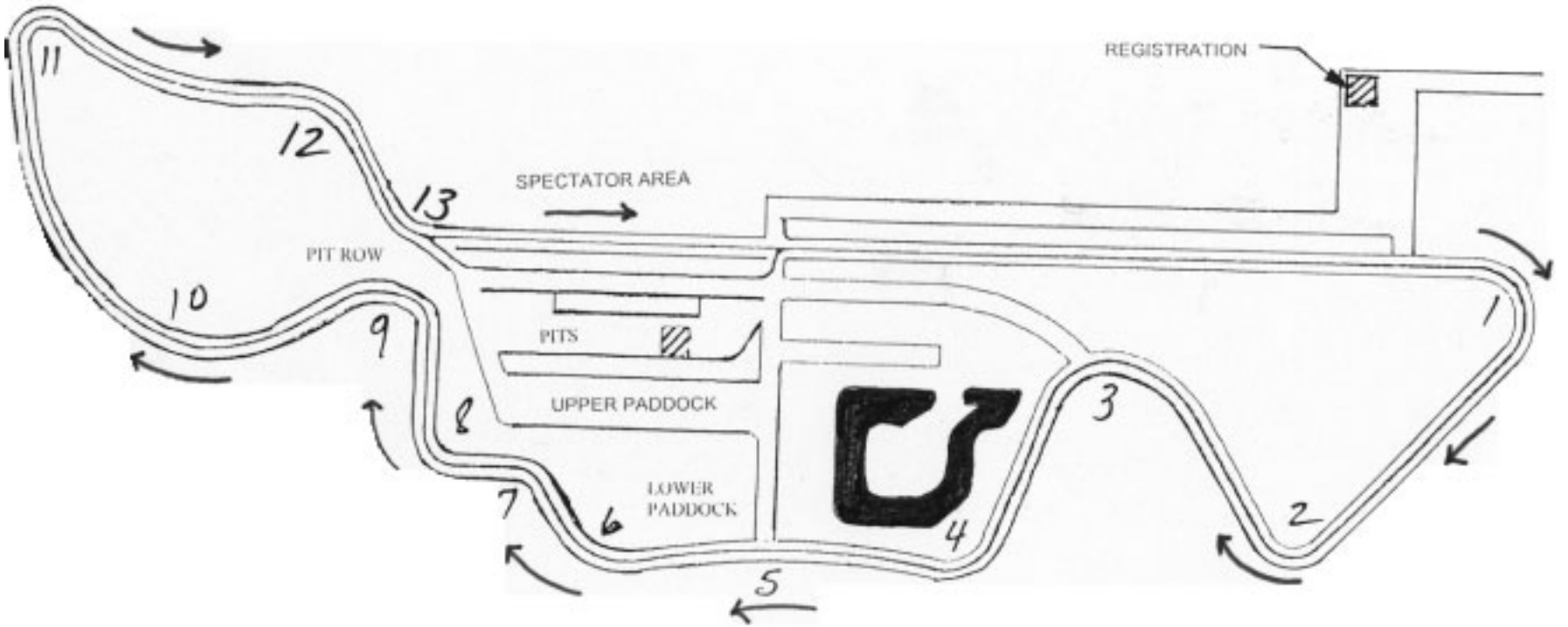
Determine each vehicle's high-speed pursuit or emergency handling characteristics and performance in comparison to the other vehicles in the test group. The course used is a 2-mile road-racing type configuration, containing hills, curves, and corners. The course simulates actual conditions encountered in pursuit or emergency driving situations in the field, with the exception of other traffic. The evaluation is a true test of the success or failure of the vehicle manufacturers to offer vehicles that provide the optimum balance between handling (suspension components), acceleration (usable horsepower), and braking characteristics.

TEST METHODOLOGY

Each vehicle is driven over the course a total of 32 timed laps, using four separate drivers, each driving an 8 lap series. The final score for the vehicle is the combined average (from the 4 drivers) of the 5 fastest laps for each driver during the 8 lap series.

Grattan Raceway Park

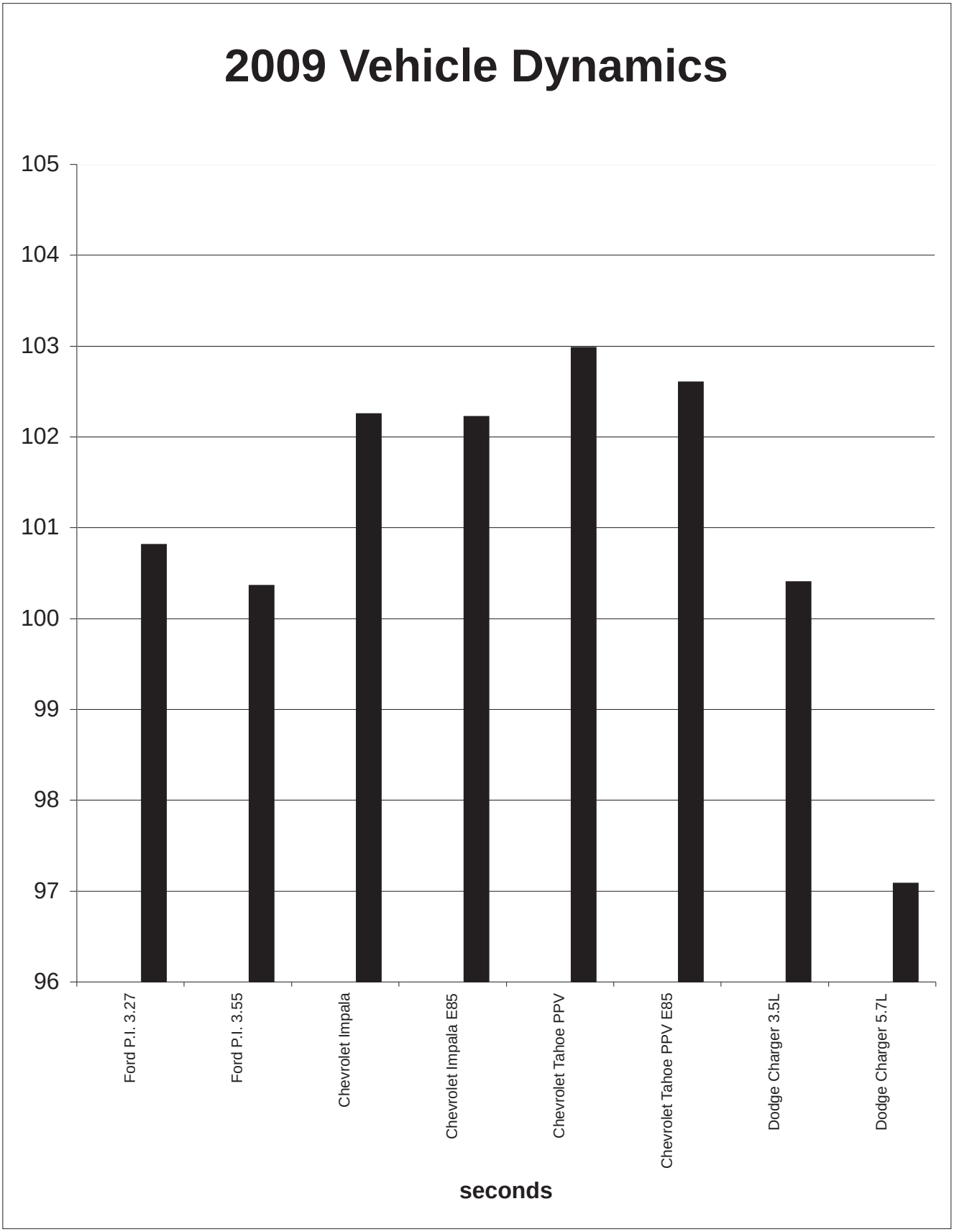
7201 Lessiter
Belding, Michigan 48809



Arrows indicate Michigan State Police Road Test Course and Direction of Travel.

VEHICLE DYNAMICS TESTING

Vehicles	Drivers	Lap 1	Lap 2	Lap 3	Lap 4	Lap 5	Average
Ford Police Interceptor 3:27 SPFI	GROMAK	01:40.40	01:40.50	01:40.50	01:40.60	01:40.60	01:40.52
	ROGERS	01:40.60	01:41.00	01:41.00	01:41.20	01:41.30	01:41.02
	WILSON	01:40.50	01:40.90	01:41.40	01:41.50	01:41.50	01:41.16
	FLEGEL	01:40.30	01:40.50	01:40.50	01:40.60	01:40.90	01:40.56
Overall Average							**01:40.81**
Ford Police Interceptor 3:55 SPFI	GROMAK	01:39.80	01:40.00	01:40.00	01:40.10	01:40.30	01:40.04
	ROGERS	01:40.80	01:40.80	01:40.90	01:40.90	01:40.90	01:40.86
	WILSON	01:40.50	01:40.60	01:40.90	01:41.00	01:41.10	01:40.82
	FLEGEL	01:39.40	01:39.70	01:39.80	01:39.80	01:39.90	01:39.72
Overall Average							**01:40.36**
Chevrolet Impala 9C1 3.9L SPFI	GROMAK	01:40.80	01:41.20	01:41.40	01:41.40	01:41.60	01:41.28
	ROGERS	01:42.30	01:42.30	01:42.60	01:42.70	01:42.80	01:42.54
	WILSON	01:42.20	01:42.40	01:42.70	01:43.40	01:43.40	01:42.82
	FLEGEL	01:42.20	01:42.20	01:42.30	01:42.50	01:42.50	01:42.34
Overall Average							**01:42.25**
Chevrolet Impala E85 3.9L SPFI	GROMAK	01:41.60	01:41.80	01:42.00	01:42.00	01:42.10	01:41.90
	ROGERS	01:41.60	01:41.80	01:41.80	01:41.90	01:42.00	01:41.82
	WILSON	01:43.10	01:43.20	01:43.30	01:43.30	01:43.40	01:43.26
	FLEGEL	01:41.60	01:41.70	01:42.00	01:42.00	01:42.30	01:41.92
Overall Average							**01:42.22**
Chevrolet Tahoe PPV 2WD 5.7L SPFI	GROMAK	01:42.40	01:42.60	01:42.70	01:42.90	01:43.00	01:42.72
	ROGERS	01:43.50	01:43.70	01:44.20	01:44.20	01:44.30	01:43.98
	WILSON	01:42.50	01:42.60	01:42.80	01:42.90	01:43.00	01:42.76
	FLEGEL	01:42.30	01:42.40	01:42.40	01:42.40	01:42.80	01:42.46
Overall Average							**01:42.98**
Chevrolet Tahoe PPV 2WD E85 5.7L SPFI	GROMAK	01:42.50	01:42.60	01:42.80	01:42.80	01:42.90	01:42.72
	ROGERS	01:43.10	01:43.20	01:43.30	01:43.30	01:43.50	01:43.28
	WILSON	01:42.10	01:42.50	01:42.50	01:42.70	01:43.20	01:42.60
	FLEGEL	01:41.50	01:41.60	01:41.70	01:42.00	01:42.10	01:41.78
Overall Average							**01:42.60**
Dodge Charger 3.5L SPFI	GROMAK	01:39.70	01:39.80	01:39.80	01:39.80	01:40.10	01:39.84
	ROGERS	01:40.70	01:40.70	01:41.00	01:41.00	01:41.20	01:40.92
	WILSON	01:40.50	01:40.50	01:40.60	01:40.80	01:40.80	01:40.64
	FLEGEL	01:40.10	01:40.10	01:40.10	01:40.30	01:40.50	01:40.22
Overall Average							**01:40.40**
Dodge Charger 5.7L SPFI	GROMAK	01:36.80	01:36.80	01:37.20	01:37.30	01:37.30	01:37.08
	ROGERS	01:36.90	01:37.30	01:37.40	01:37.50	01:37.60	01:37.34
	WILSON	01:37.20	01:37.80	01:37.90	01:38.40	01:38.50	01:37.96
	FLEGEL	01:35.70	01:35.80	01:36.00	01:36.10	01:36.10	01:35.94
Overall Average							**01:37.08**


2009 Vehicle Dynamics
105
104
103
102
101
100
99
98
97
96
Ford P.I. 3.27
Ford P.I. 3.55
Chevrolet Impala
Chevrolet Impala E85
Chevrolet Tahoe PPV
Chevrolet Tahoe PPV E85
Dodge Charger 3.5L
Dodge Charger 5.7L
seconds

ACCELERATION AND TOP SPEED TESTING

ACCELERATION TEST OBJECTIVE

Determine the ability of each test vehicle to accelerate from a standing start to 60 mph, 80 mph, and 100 mph, and determine the distance to reach 110 mph and 120 mph.

ACCELERATION TEST METHODOLOGY

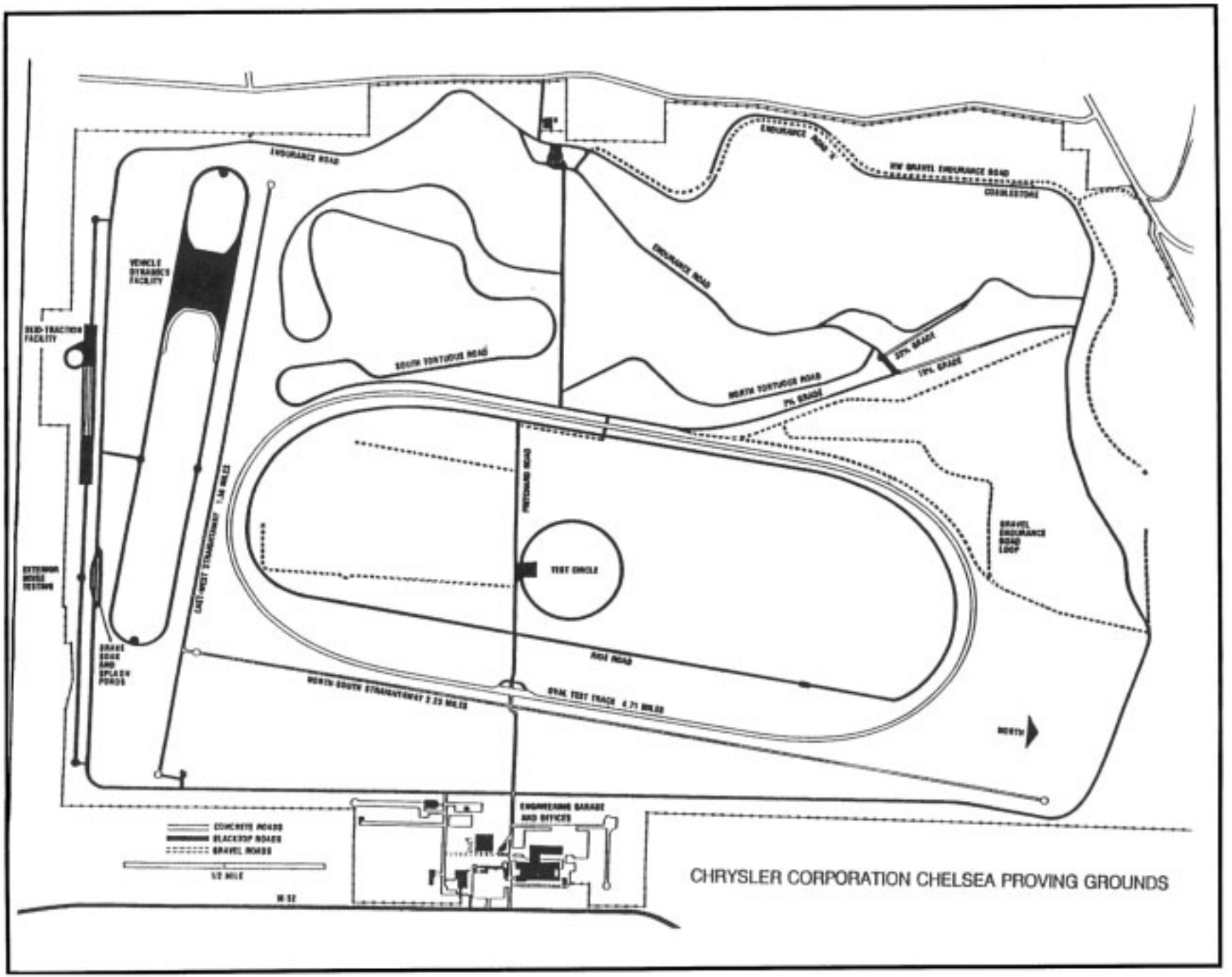
Using a DLS Smart Sensor – Optical non-contact Speed and Distance Sensor in conjunction with a lap top computer, each vehicle is driven through four acceleration sequences, two northbound and two southbound, to allow for wind direction. The four resulting times for each target speed are averaged and the average times used to derive scores on the competitive test for acceleration.

TOP SPEED TEST OBJECTIVE

Determine the actual top speed attainable by each test vehicle within a distance of 14 miles from a standing start.

TOP SPEED TEST METHODOLOGY

Following the fourth acceleration run, each test vehicle continues to accelerate to the top speed attainable within 14 miles from the start of the run. The highest speed attained within the 14-mile distance is the vehicle's score on the competitive test for top speed.


ENDURANCE ROAD
VEHICLE DYNAMICS FACILITY
SKID-TRACTION FACILITY
SOUTH TORTUOUS ROAD
NORTH TORTUOUS ROAD
7% GRADE
10% GRADE
19% GRADE
PROVING ROAD
TEST CIRCLE
GRAVEL ENDURANCE ROAD LOOP
RIDE ROAD
NORTH SOUTH STRAIGHTAWAY 7.23 MILES
OVAL TEST TRACK 4.71 MILES
EAST-WEST STRAIGHTAWAY 1.34 MILES
BRAKE DOME AND SPLASH PONDS
ENGINEERING GARAGE AND OFFICES
CONCRETE ROADS
BLACKTOP ROADS
GRAVEL ROADS
1/2 MILE
M-52
NORTH
CHRYSLER CORPORATION CHELSEA PROVING GROUNDS

ACCELERATION AND TOP SPEED TESTS

TEST LOCATION: Chrysler Proving Grounds **DATE:** September 20, 2008

MAKE & MODEL: Ford Interceptor 4.6L 3.27 **BEGINNING TIME:** 8:43 a.m.

WIND VELOCITY: 0 **WIND DIRECTION**: 0° **TEMPERATURE:** 60.1°

ACCELERATION

SPEEDS	TIME REQUIREMENTS*	RUN#1	RUN#2	RUN#3	RUN#4	AVERAGE
0 – 60	**9.6 sec**	8.94	8.79	8.81	8.83	**8.84**
0 – 80	**16.4 sec.**	14.51	14.38	14.48	14.27	**14.41**
0 – 100	**27.1 sec.**	24.18	23.89	24.11	24.09	**24.07**

DISTANCE TO REACH: **110 MPH** .66 mile **120 MPH** 1.02 mile

TOP SPEED ATTAINED: 128 mph

MAKE & MODEL: Ford Police Interceptor 4.6L 3.55 **BEGINNING TIME:** 10:23 a.m.

WIND VELOCITY: 1.8 mph **WIND DIRECTION:** 291° **TEMPERATURE:** 73.9°

ACCELERATION

SPEEDS	TIME REQUIREMENTS*	RUN#1	RUN#2	RUN#3	RUN#4	AVERAGE
0 – 60	**9.6 sec**	8.90	8.80	8.68	8.78	**8.79**
0 – 80	**16.4 sec.**	14.72	14.37	14.30	14.30	**14.42**
0 – 100	**27.1 sec.**	24.17	23.65	23.67	23.33	**23.70**

DISTANCE TO REACH: **110 MPH** .63 mile **120 MPH** 2.40

TOP SPEED ATTAINED: 120 mph

*Michigan State Police minimum requirement.

ACCELERATION AND TOP SPEED TESTS

TEST LOCATION: Chrysler Proving Grounds **DATE:** September 20, 2008

MAKE & MODEL: Chevrolet Impala 9C1 **BEGINNING TIME:** 8:08 a.m.

WIND VELOCITY: 0 **WIND DIRECTION:** 0° **TEMPERATURE:** 49.5°

ACCELERATION

SPEEDS	TIME REQUIREMENTS*	RUN#1	RUN#2	RUN#3	RUN#4	AVERAGE
0 – 60	**9.6 sec**	8.29	8.46	8.35	8.38	**8.37**
0 – 80	**16.4 sec.**	13.26	13.44	13.39	13.46	**13.39**
0 – 100	**27.1 sec.**	22.15	22.39	22.26	22.07	**22.22**

DISTANCE TO REACH: **110 MPH** .58 mile **120 MPH** .82

TOP SPEED ATTAINED: 139 mph

MAKE & MODEL: Chevrolet Impala 9C1 E85 **BEGINNING TIME:** 1:05 p.m.

WIND VELOCITY: 6.4 mph **WIND DIRECTION:** 319° **TEMPERATURE:** 78.7°

ACCELERATION

SPEEDS	TIME REQUIREMENTS*	RUN#1	RUN#2	RUN#3	RUN#4	AVERAGE
0 – 60	**9.6 sec**	8.64	8.61	8.52	8.61	**8.59**
0 – 80	**16.4 sec.**	13.90	13.91	13.55	13.76	**13.78**
0 – 100	**27.1 sec.**	22.77	22.71	22.14	22.50	**22.53**

DISTANCE TO REACH: **110 MPH** .57 mile **120 MPH** .82 mile

TOP SPEED ATTAINED: 140 mph

*Michigan State Police minimum requirement.

ACCELERATION AND TOP SPEED TESTS

TEST LOCATION: Chrysler Proving Grounds **DATE:** September 20, 2008

MAKE & MODEL: Dodge Charger 5.7L **BEGINNING TIME:** 9:12 a.m.

WIND VELOCITY: 1.2 mph **WIND DIRECTION:** 36° **TEMPERATURE:** 67.1°

ACCELERATION

SPEEDS	TIME REQUIREMENTS*	RUN#1	RUN#2	RUN#3	RUN#4	AVERAGE
0 – 60	**9.6 sec**	6.10	5.94	5.85	5.94	**5.96**
0 – 80	**16.4 sec.**	9.58	9.32	9.12	9.39	**9.35**
0 – 100	**27.1 sec.**	14.72	14.15	14.14	14.15	**14.29**

DISTANCE TO REACH: **110 MPH** .33 mile **120 MPH** .42 mile

TOP SPEED ATTAINED: 146 mph

MAKE & MODEL: Dodge Charger 3.5L **BEGINNING TIME:** 10:52 a.m.

WIND VELOCITY: 3.7 mph **WIND DIRECTION:** 322° **TEMPERATURE:** 72.6°

ACCELERATION

SPEEDS	TIME REQUIREMENTS*	RUN#1	RUN#2	RUN#3	RUN#4	AVERAGE
0 – 60	**9.6 sec**	8.95	8.79	8.80	8.62	**8.79**
0 – 80	**16.4 sec.**	14.61	14.32	14.30	14.08	**14.33**
0 – 100	**27.1 sec.**	23.85	23.48	23.52	23.21	**23.52**

DISTANCE TO REACH: **110 MPH** .60 mile **120 MPH** .87 mile

TOP SPEED ATTAINED: 136 mph

*Michigan State Police minimum requirement.

ACCELERATION AND TOP SPEED TESTS

TEST LOCATION: Chrysler Proving Grounds **DATE:** September 20, 2008

MAKE & MODEL: Chevrolet Tahoe PPV **BEGINNING TIME:** 9:58 a.m.

WIND VELOCITY: 2.9 mph **WIND DIRECTION:** 258° **TEMPERATURE:** 72°

ACCELERATION

SPEEDS	TIME REQUIREMENTS*	RUN#1	RUN#2	RUN#3	RUN#4	AVERAGE
0 – 60	**10.0 sec**	8.43	8.34	8.42	8.39	**8.40**
0 – 80	**16.0 sec.**	13.65	13.44	13.52	13.45	**13.51**
0 – 100	**27.0 sec.**	22.79	22.41	22.61	22.44	**22.56**

DISTANCE TO REACH: **110 MPH** .56 mile **120 MPH** .79 mile

TOP SPEED ATTAINED: 132 mph

MAKE & MODEL: Chevrolet Tahoe PPV E85 **BEGINNING TIME:** 12:24 p.m.

WIND VELOCITY: 7.4 mph **WIND DIRECTION:** 314° **TEMPERATURE:** 77.4°

ACCELERATION

SPEEDS	TIME REQUIREMENTS*	RUN#1	RUN#2	RUN#3	RUN#4	AVERAGE
0 – 60	**10.0 sec**	8.62	8.34	8.46	8.59	**8.50**
0 – 80	**16.0 sec.**	13.64	13.43	13.60	13.66	**13.58**
0 – 100	**27.0 sec.**	23.14	22.34	23.11	22.83	**22.86**

DISTANCE TO REACH: **110 MPH** .58 mile **120 MPH** .81 mile

TOP SPEED ATTAINED: 133 mph

*Michigan State Police minimum requirement.

SUMMARY OF ACCELERATION AND TOP SPEED

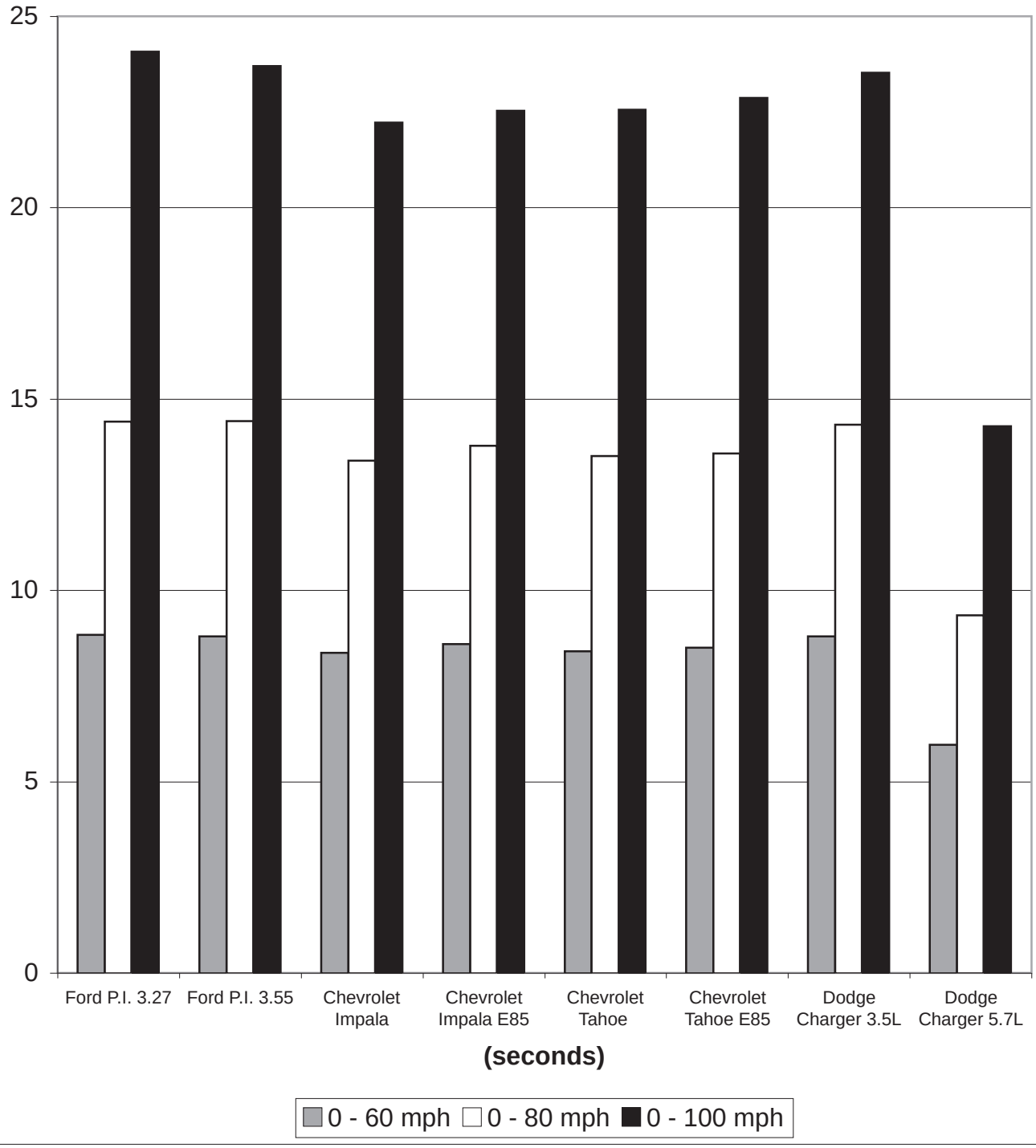
ACCELERATION*		Ford Police Interceptor 4.6 L 3.27	Ford Police Interceptor 4.6 L 3.55	Dodge Charger 3.5 L	Dodge Charger 5.7 L
0 – 20 mph	(sec.)	1.92	1.95	2.08	1.59
0 – 30 mph	(sec.)	3.19	3.17	3.41	2.52
0 – 40 mph	(sec.)	4.57	4.60	4.83	3.43
0 – 50 mph	(sec.)	6.56	6.64	6.58	4.54
0 – 60 mph	(sec.)	8.84	8.79	8.79	5.96
0 – 70 mph	(sec.)	11.30	11.23	11.37	7.45
0 – 80 mph	(sec.)	14.41	14.42	14.33	9.35
0 – 90 mph	(sec.)	18.49	18.70	18.55	11.71
0 – 100 mph	(sec.)	24.07	23.70	23.52	14.29
TOP SPEED	(mph)	128	120	136	146
DISTANCE TO REACH					
110 mph (miles)		.66	.63	.60	.33
120 mph (miles)		1.02	2.40	.87	.42
QUARTER MILE					
Time	(sec.)	16.69	16.71	16.77	14.43
Speed (miles)		86.07	85.56	85.91	100.54

SUMMARY OF ACCELERATION AND TOP SPEED

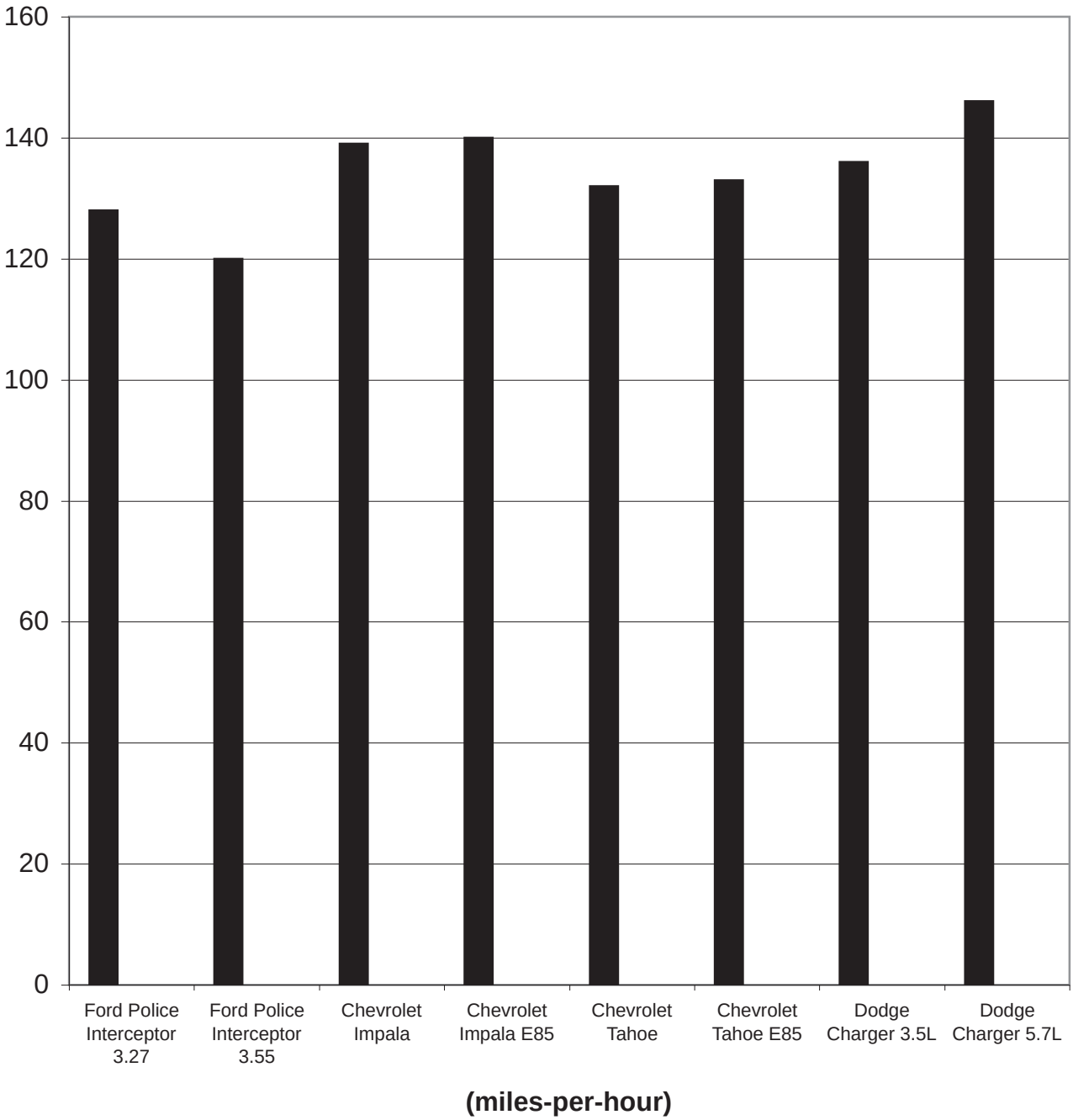
ACCELERATION*		Chevrolet Impala 9C1 3.9 L	Chevrolet Impala 9C1 3.9L E85	Chevrolet Tahoe PPV	Chevrolet Tahoe PPV E85
0 – 20 mph	(sec.)	1.97	2.06	2.10	2.15
0 – 30 mph	(sec.)	3.15	3.29	3.32	3.39
0 – 40 mph	(sec.)	4.40	4.57	4.52	4.62
0 – 50 mph	(sec.)	6.08	6.27	6.31	6.39
0 – 60 mph	(sec.)	8.37	8.59	8.40	8.50
0 – 70 mph	(sec.)	10.77	11.05	10.58	10.70
0 – 80 mph	(sec.)	13.39	13.78	13.51	13.58
0 – 90 mph	(sec.)	16.86	17.40	17.80	18.03
0 – 100 mph	(sec.)	22.22	22.53	22.56	22.86
TOP SPEED	(mph)	139	140	132	133
DISTANCE TO REACH					
110 mph	(miles)	.58	.57	.56	.58
120 mph	(miles)	.82	.82	.79	.81
QUARTER MILE					
Time	(sec.)	16.36	16.58	16.46	16.53
Speed	(miles)	88.77	88.11	86.83	86.69

2009 ACCELERATION COMPARISON

ACCELERATION TIMES



2009 TOP SPEED COMPARISON



BRAKE TESTING

BRAKE TEST OBJECTIVE

Determine the deceleration rate attained by each test vehicle on twelve 60 – 0 mph impending skid (threshold) stops, with ABS in operation if the vehicle is so equipped. Each vehicle is scored on the average deceleration rate it attains.

BRAKE TEST METHODOLOGY

Each vehicle makes two decelerations at specific predetermined points on the test road from 90 – 0 mph at 22 ft/s^2, with the driver using a decelerometer to maintain the deceleration rate. Immediately after these "heat-up" stops are completed, the vehicle is turned around and makes six measured 60 – 0 mph impending skid (threshold) stops with ABS in operation, if so equipped, at specific predetermined points. Following a four (4) minute heat soak, the entire sequence is repeated. The exact initial velocity at the beginning of each of the 60 – 0 mph decelerations, and the exact distance required to make each stop is recorded by means of a non contact optical sensor in conjunction with electronic speed and distance meters. The data resulting from the twelve total stops is used to calculate the average deceleration rate which is the vehicle's score for this test.

DECELERATION RATE FORMULA

$$\text{Deceleration Rate (DR)} = \frac{\text{Initial Velocity*(IV) squared}}{\text{2 times Stopping Distance (SD)}} = \frac{(IV)^2}{2\,(SD)}$$

EXAMPLE:

Initial Velocity = 89.175 ft/s (60.8 mph x 1.4667*)
Stopping Distance = 171.4 ft.

$$DR = \frac{(IV)^2}{2(SD)} = \frac{(89.175)^2}{2(171.4)} = \frac{7952.24}{342.8} = 23.198 \text{ ft/s}^2$$

Once a vehicle's average deceleration rate has been determined, it is possible to calculate the stopping distance from any given speed by utilizing the following formula:

Select a speed; translate that speed into feet per second; square the feet per second figure by multiplying it by itself; divide the resultant figure by 2; divide the remaining figure by the average deceleration rate of the vehicle in question.

EXAMPLE:

60 mph = 88.002 ft/s x 88.002 = 7744.352 / 2 = 3872.176 / 23.198 ft/s^2 = 166.9 ft.

*Initial velocity must be expressed in terms of feet per second, with 1 mile per hour being equal to 1.4667 feet per second.

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds **DATE:** September 20, 2008

BEGINNING Time: 10:18 a.m. **TEMPERATURE:** 73.3°F

MAKE & MODEL: Ford Police Interceptor 4.6L **BRAKE SYSTEM:** Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.51 mph	142.43 feet	27.65 ft/s^2
Stop #2	60.31 mph	142.84 feet	27.39 ft/s^2
Stop #3	60.08 mph	144.48 feet	26.87 ft/s^2
Stop #4	60.47 mph	143.73 feet	27.36 ft/s^2
Stop #5	60.81 mph	145.85 feet	27.27 ft/s^2
Stop #6	60.48 mph	144.90 feet	27.15 ft/s^2

AVERAGE DECELERATION RATE 27.28 ft/s^2

HEAT SOAK (4 minutes)

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.38 mph	140.91 feet	27.83 ft/s^2
Stop #2	60.26 mph	145.43 feet	26.86 ft/s^2
Stop #3	60.68 mph	145.59 feet	27.20 ft/s^2
Stop #4	60.24 mph	144.07 feet	27.09 ft/s^2
Stop #5	60.55 mph	146.86 feet	26.85 ft/s^2
Stop #6	60.50 mph	147.30 feet	26.73 ft/s^2

AVERAGE DECELERATION RATE 27.09 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 27.19 ft/s^2

Projected Stopping Distance from 60.0 mph 142.4

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds **DATE:** September 20, 2008

BEGINNING Time: 9:43 a.m. **TEMPERATURE:** 71°F

MAKE & MODEL: Chevrolet Impala 9C1 3.9L E85 **BRAKE SYSTEM:** Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.19 mph	138.81 feet	28.07 ft/s^2
Stop #2	59.31 mph	139.12 feet	27.20 ft/s^2
Stop #3	60.08 mph	142.14 feet	27.31 ft/s^2
Stop #4	60.71 mph	148.34 feet	26.72 ft/s^2
Stop #5	60.85 mph	151.66 feet	26.26 ft/s^2
Stop #6	61.05 mph	151.57 feet	26.45 ft/s^2

AVERAGE DECELERATION RATE 27.00 ft/s^2

HEAT SOAK (4 minutes)

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.75 mph	150.48 feet	26.38 ft/s^2
Stop #2	59.88 mph	144.51 feet	26.69 ft/s^2
Stop #3	60.72 mph	148.94 feet	26.63 ft/s^2
Stop #4	60.92 mph	148.12 feet	26.95 ft/s^2
Stop #5	60.94 mph	152.47 feet	26.20 ft/s^2
Stop #6	60.91 mph	146.31 feet	27.27 ft/s^2

AVERAGE DECELERATION RATE 26.69 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 26.84 ft/s^2

Projected Stopping Distance from 60.0 mph 144.2

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds

DATE: September 20, 2008

BEGINNING Time: 12:01 p.m.

TEMPERATURE: 77.5°F

MAKE & MODEL: Dodge Charger 3.5L

BRAKE SYSTEM: Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.96 mph	141.08 feet	28.33 ft/s^2
Stop #2	60.28 mph	136.13 feet	28.71 ft/s^2
Stop #3	60.77 mph	138.06 feet	28.77 ft/s^2
Stop #4	60.07 mph	134.38 feet	28.88 ft/s^2
Stop #5	60.77 mph	140.53 feet	28.27 ft/s^2
Stop #6	60.00 mph	137.66 feet	28.13 ft/s^2

AVERAGE DECELERATION RATE 28.52 ft/s^2

HEAT SOAK (4 minutes)

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	59.98 mph	137.81 feet	28.08 ft/s^2
Stop #2	61.12 mph	135.95 feet	29.56 ft/s^2
Stop #3	60.31 mph	136.92 feet	28.57 ft/s^2
Stop #4	60.57 mph	134.96 feet	29.24 ft/s^2
Stop #5	60.76 mph	139.53 feet	28.46 ft/s^2
Stop #6	60.61 mph	136.79 feet	28.89 ft/s^2

AVERAGE DECELERATION RATE 28.80 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 28.66 ft/s^2

Projected Stopping Distance from 60.0 mph 135.1

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds

DATE: September 20, 2008

BEGINNING Time: 11:30 a.m.

TEMPERATURE: 76°F

MAKE & MODEL: Dodge Charger 5.7L

BRAKE SYSTEM: Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.31 mph	140.13 feet	27.92 ft/s^2
Stop #2	60.84 mph	136.96 feet	29.07 ft/s^2
Stop #3	60.62 mph	136.96 feet	28.86 ft/s^2
Stop #4	60.92 mph	137.07 feet	29.12 ft/s^2
Stop #5	60.61 mph	140.13 feet	28.20 ft/s^2
Stop #6	61.48 mph	140.78 feet	28.88 ft/s^2

AVERAGE DECELERATION RATE 28.67 ft/s^2

HEAT SOAK (4 minutes)

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.09 mph	137.42 feet	28.26 ft/s^2
Stop #2	60.49 mph	135.53 feet	29.04 ft/s^2
Stop #3	60.88 mph	140.85 feet	28.30 ft/s^2
Stop #4	60.10 mph	136.41 feet	28.48 ft/s^2
Stop #5	61.05 mph	137.69 feet	29.12 ft/s^2
Stop #6	60.52 mph	138.24 feet	28.50 ft/s^2

AVERAGE DECELERATION RATE 28.62 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 28.65 ft/s^2

Projected Stopping Distance from 60.0 mph 135.2

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds

DATE: September 20, 2008

BEGINNING Time: 10:08 a.m.

TEMPERATURE: 72.1F

MAKE & MODEL: Chevrolet Tahoe 5.7L 2WD

BRAKE SYSTEM: Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.22 mph	141.28 feet	27.61 ft/s^2
Stop #2	60.15 mph	141.72 feet	27.46 ft/s^2
Stop #3	60.15 mph	145.16 feet	26.81 ft/s^2
Stop #4	60.73 mph	147.10 feet	26.97 ft/s^2
Stop #5	60.93 mph	145.05 feet	27.53 ft/s^2
Stop #6	60.55 mph	142.85 feet	27.61 ft/s^2

AVERAGE DECELERATION RATE 27.33 ft/s^2

HEAT SOAK (4 minutes)

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	59.75 mph	141.11 feet	27.21 ft/s^2
Stop #2	60.40 mph	144.67 feet	27.12 ft/s^2
Stop #3	60.38 mph	147.07 feet	26.66 ft/s^2
Stop #4	60.71 mph	146.72 feet	27.02 ft/s^2
Stop #5	60.51 mph	150.99 feet	26.08 ft/s^2
Stop #6	60.22 mph	147.64 feet	26.42 ft/s^2

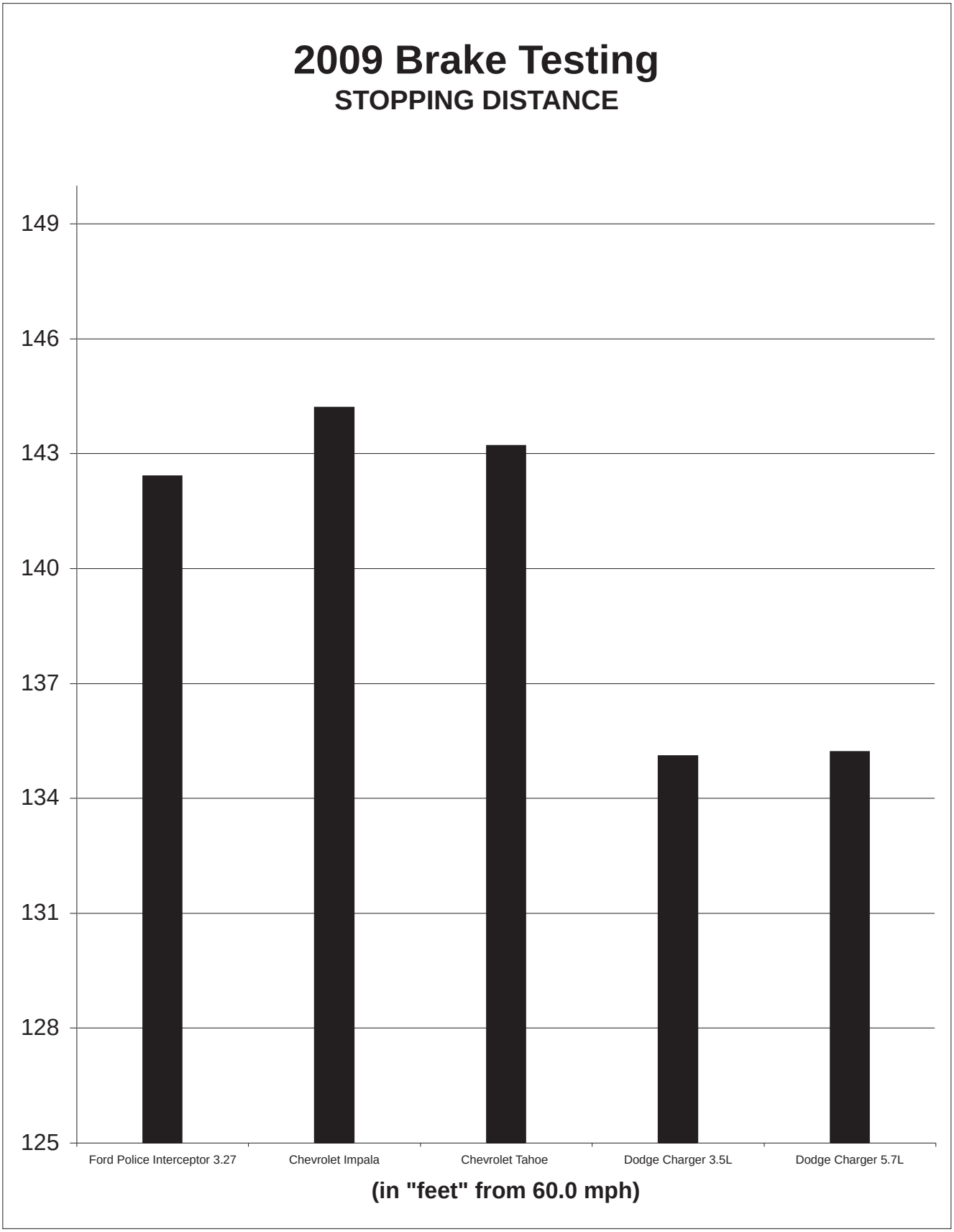
AVERAGE DECELERATION RATE 26.75 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 27.04 ft/s^2

Projected Stopping Distance from 60.0 mph 143.2


2009 Brake Testing
STOPPING DISTANCE
149
146
143
140
137
134
131
128
125
Ford Police Interceptor 3.27
Chevrolet Impala
Chevrolet Tahoe
Dodge Charger 3.5L
Dodge Charger 5.7L
(in "feet" from 60.0 mph)

ERGONOMICS AND COMMUNICATIONS

TEST OBJECTIVE

Rate each test vehicle's ability to:

1. Provide a suitable environment for the patrol officer in the performance of his/her assigned tasks.

2. Accommodate the required communications and emergency warning equipment and assess the relative difficulty of such installations.

TEST METHODOLOGY

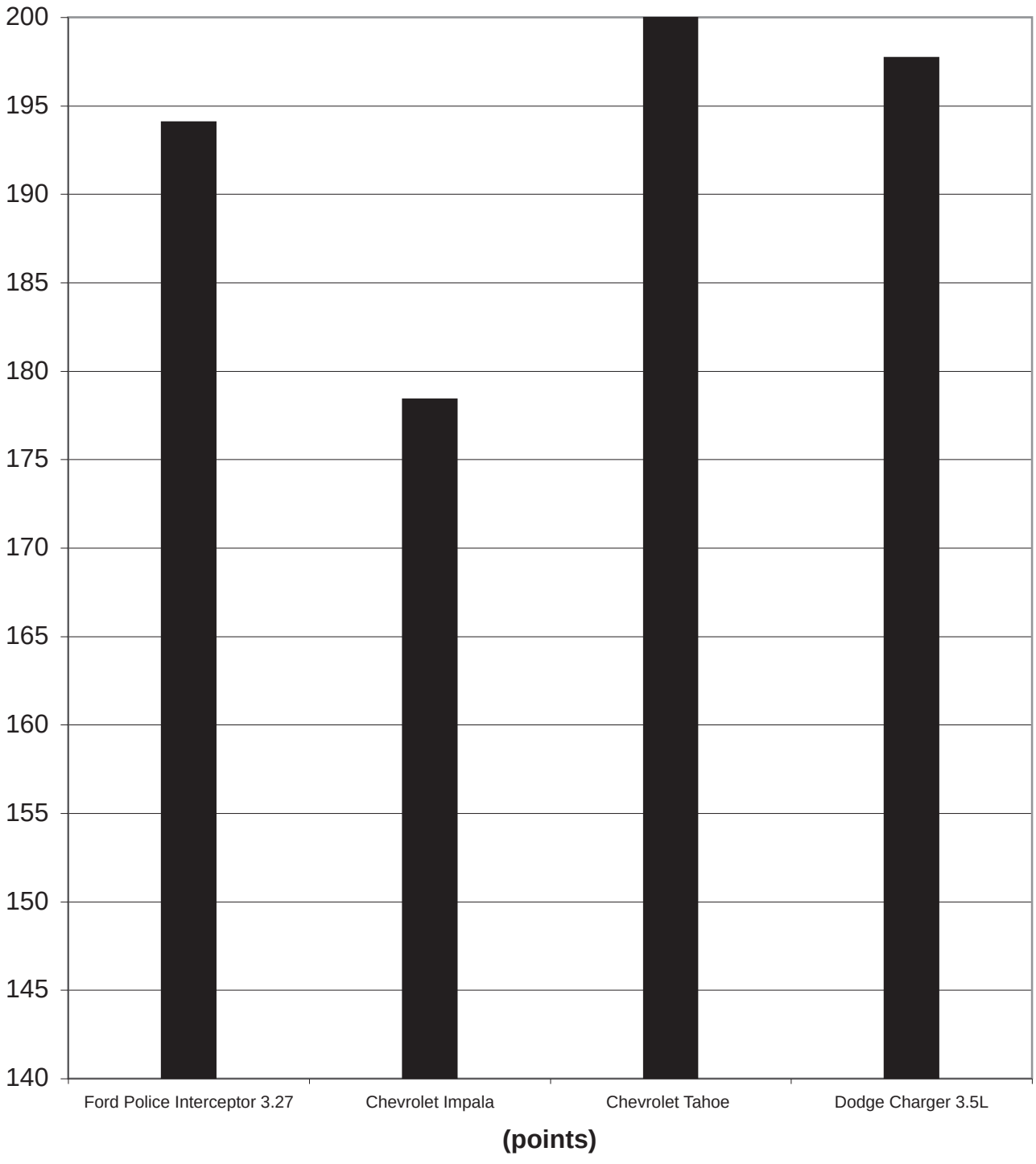
Utilizing the ergonomics portion of the form, a minimum of four officers (in this case 10) individually and independently compare and score each test vehicle on the various comfort, instrumentation, and visibility items. The installation and communications portion of the evaluation is conducted by personnel from DIT Communications, based upon the relative difficulty of the necessary installations. Each factor is graded on a 1 to 10 scale, with 1 representing "totally unacceptable," 5 representing "average," and 10 representing "superior." The scores are averaged to minimize personal prejudice for or against any given vehicle.

ERGONOMICS AND COMMUNICATIONS

ERGONOMICS	Ford Police Interceptor	Dodge Charger	Chevrolet Impala 9C1	Chevrolet Tahoe PPV
FRONT SEAT				
Padding	7.20	6.90	6.60	7.60
Depth of Bucket Seat	6.90	6.20	6.50	7.20
Adjustability – Front to Rear	8.10	7.70	6.70	7.00
Upholstery	6.40	7.10	6.30	6.90
Bucket Seat Design	6.60	7.00	6.30	7.40
Headroom	7.80	8.20	6.60	9.20
Seatbelts	6.00	7.50	7.20	7.10
Ease of Entry and Exit	6.90	7.00	5.80	8.40
Overall Comfort Rating	7.10	7.30	6.60	8.30
REAR SEAT				
Leg room – Front seat back	5.10	6.30	3.60	7.90
Ease of Entry and Exit	5.10	5.90	3.40	7.80
INSTRUMENTATION				
Clarity	6.60	7.50	7.10	7.70
Placement	6.70	7.50	8.00	7.30
VEHICLE CONTROLS				
Pedals, Size and Position	6.80	7.30	6.80	7.80
Power Window Switch	7.20	8.10	7.70	8.20
Inside Door Lock Switch	7.20	8.40	6.30	7.90
Automatic Door Lock Switch	7.60	7.00	6.40	7.50
Outside Mirror Controls	6.70	6.70	6.10	8.10
Steering Wheel, Size, Tilt Release, and Surface	7.50	6.60	7.40	8.30
Heat/AC Vent Placement and Adjustability	7.20	7.00	6.80	6.90
VISIBILITY				
Front (Windshield)	8.40	7.80	8.00	8.80
Rear (Back Window)	7.10	6.30	5.90	6.20
Left Rear Quarter	7.20	6.10	6.10	5.50
Right Rear Quarter	6.90	6.10	6.00	5.40
Outside Rear View Mirrors	6.40	6.40	4.60	8.40
COMMUNICATIONS				
Dashboard Accessibility	6.90	7.50	6.80	7.80
Trunk Accessibility	7.80	7.80	6.80	7.60
Engine Compartment	6.67	6.50	6.00	6.67
TOTAL SCORES	**194.07**	**197.70**	**178.40**	**210.87**

2009 ERGONOMICS/COMMUNICATIONS

VEHICLE SCORES



FUEL ECONOMY

TEST OBJECTIVE

Determine the fuel economy potential of all vehicles being evaluated. The data used for scoring are both valid and reliable in a comparison sense, while not necessarily being an accurate predictor of actual fuel economy in police patrol service.

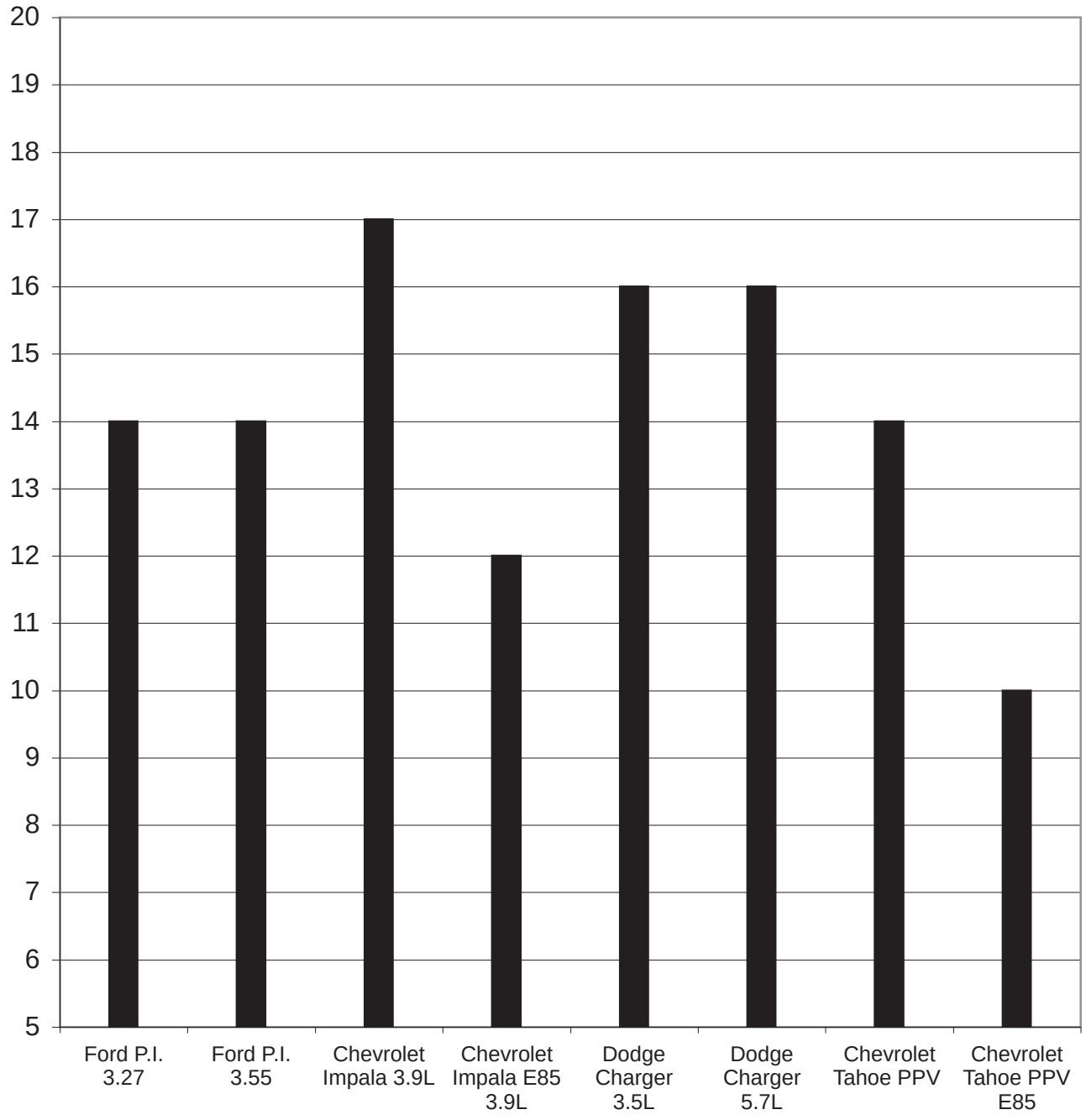
TEST METHODOLOGY

The vehicles will be scored based on estimates for city fuel economy to the nearest 1/10th mile per gallon (mpg) developed from data supplied by the vehicle manufacturer and certified by the Environmental Protection Agency.

Vehicles Make/Model/Engine		E.P.A. Miles Per Gallon					
		City		Highway		Combined	
		Label	Unadjusted	Label	Unadjusted	Label	Unadjusted
Ford Police Interceptor 3.27	4.6L SPFI	14	17.9	21	29.7	17	21.7
Ford Police Interceptor 3.55	4.6L SPFI	14	17.9	21	29.7	17	21.7
Chevrolet Impala	3.9L SPFI	17	21.2	24	33.8	20	25.5
Chevrolet Impala E85	3.9L SPFI	12	15.5	18	24.7	15	18.6
Dodge Charger	3.5L SPFI	16	20.9	25	34.1	19	25.3
Dodge Charger	5.7L SPFI	16	19.3	25	34.6	19	24.1
Chevrolet Tahoe PPV	5.3L SPFI	14	17.3	19	26.3	16	20.4
Chevrolet Tahoe E85 PPV	5.3L SPFI	10	12.7	13	18.6	11	14.8

2009 FUEL ECONOMY COMPARISON

"CITY" EPA ESTIMATES



MICHIGAN STATE POLICE
SCORING AND BID ADJUSTMENT METHODOLOGY*

STEP I: RAW SCORES

Raw scores are developed, through testing, for each vehicle in each of six evaluation categories. The raw scores are expressed in terms of seconds, feet per second^2, miles-per-hour, points, and miles-per-gallon.

VEHICLE DYNAM. (seconds)	BRAKING RATE (ft/sec^2)	ACCEL. (seconds)	TOP SPEED (mph)	ERGONOMICS & COMMUN. (points)	FUEL ECONOMY (mpg)
92.210	26.380	45.790	115.000	173.900	14.300

STEP II: DEVIATION FACTOR

In each evaluation category, the best scoring vehicle's score is used as the benchmark against which each of the other vehicles' scores are compared. (In the Vehicle Dynamics and Acceleration categories the lowest score is best, while in the remainder of the categories the highest score is best.) The best scoring vehicle in a given category received a deviation factor of "0." The "deviation factor" is then calculated by determining the absolute difference between each vehicle's raw score and the best score in that category. The absolute difference is then divided by the best score, with the result being the "deviation factor."

CAR MAKE MODEL	TOP SPEED
CAR "A"	115.000 **.042**
CAR "B"	118.800 **.010**
CAR "C"	117.900 **.018**
CAR "D"	120.000 **0**

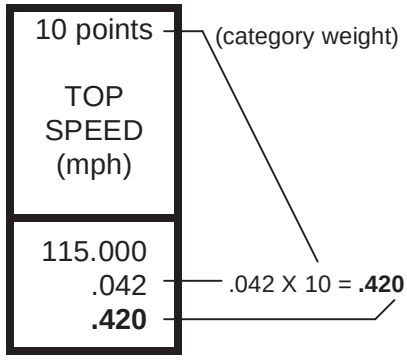
EXAMPLE:

Best Score (Car "D")		Other Vehicle Score (Car "A")		Absolute Difference		Best Score		Deviation Factor (Car "A")
120.000	-	115.000	=	5	/	120.000	=	**.042**

STEP III: WEIGHTED CATEGORY SCORE

Each vehicle's weighted category score is determined by multiplying the deviation factor (as determined in Step II) by the category weight.

RAW SCORE
DEVIATION FACTOR
WEIGHTED CATEGORY SCORE



*All mathematical computations are to be rounded to the third decimal place.

STEP IV: TOTAL WEIGHTED SCORE

Adding together the six (6) weighted category scores for that vehicle derives the total weighted score for each vehicle.

EXAMPLE:

CAR	30 pts. VEH. DYN. (seconds)	25 pts. BRAKE DECEL. (ft/sec^2)	20 pts. ACCEL. (seconds)	10 pts. TOP SPEED (mph)	10 pts. ERGO/ COMM. (points)	5 pts. FULE ECON. (mpg)	TOTAL WEIGHTED SCORE
Car "A"	92.210 .018 .540	45.790 .163 4.075	26.380 0 0	115.000 .042 .420	173.900 .184 1.840	14.300 0 0	**6.875**

STEP V: BID ADJUSTMENT FIGURE

The bid adjustment figure that we have chosen to use is one percent (1%) of the lowest bid price received. As an example, in this and the following two steps, the lowest bid price received was $15,238.00, which results in a bid adjustment figure of **$152.38**.

STEP VI: ACTUAL DOLLAR ADJUSTMENT

The actual dollar adjustment for a vehicle is determined by multiplying that vehicle's total weighted score by the bid adjustment figure as shown at right.

TOTAL WTD. SCORE	BID ADJ. FIGURE	ACTUAL DOLLAR ADJ.
	X	=
6.875	$152.38	**$1,047.61**

STEP VII: ADJUSTED BID PRICE

The actual dollar adjustment amount arrived at for each vehicle is added to that vehicle's bid price. Provided other necessary approvals are received, the vehicle with the lowest adjusted bid price will be the vehicle purchased. (The amount paid for the purchased vehicles will be the actual bid price.)

ACTUAL DOLLAR ADJ.	ACTUAL BID PRICE	ADJ. BID PRICE
	+	=
$955.42	$15,473.00	**$16,520.61**

PERFORMANCE COMPARISONS OF 2008 AND 2009 TEST VEHICLES

The following charts illustrate the scores achieved by each make and model of vehicle tested for model years 2008 and 2009. The charts presented are for the following performance categories:

Vehicle Dynamics
Acceleration 0 – 60 mph
Acceleration 0 – 80 mph
Acceleration 0 – 100 mph
Top Speed
Braking (Calculated 60 – 0 mph Stopping Distance)

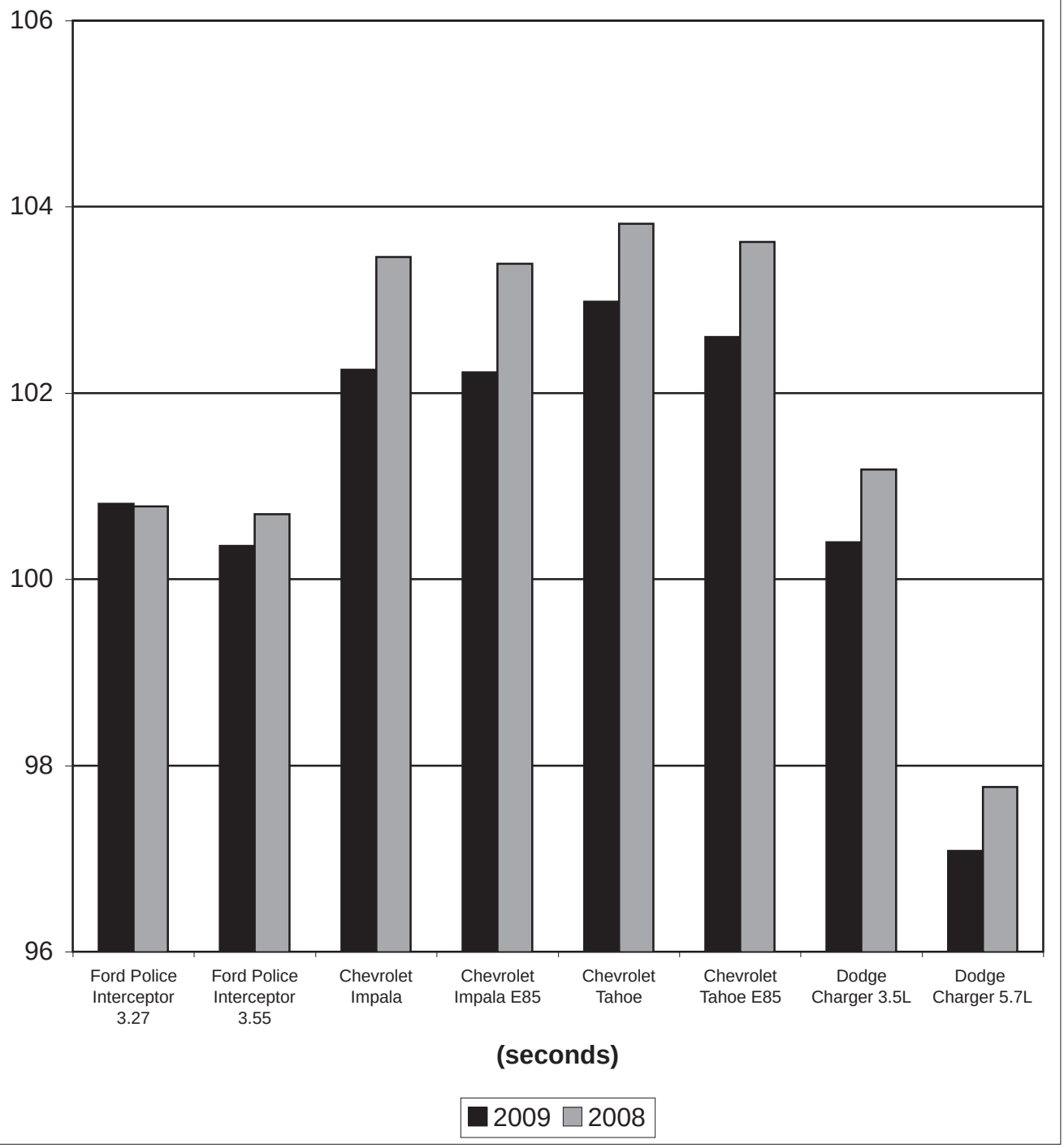
The reader should bear in mind the following information regarding variables when reviewing the 2008 – 2009 performance comparison charts. While as many variables as possible are eliminated from a given year's testing, those that occur over the span of a full year are sometimes impossible to eliminate.

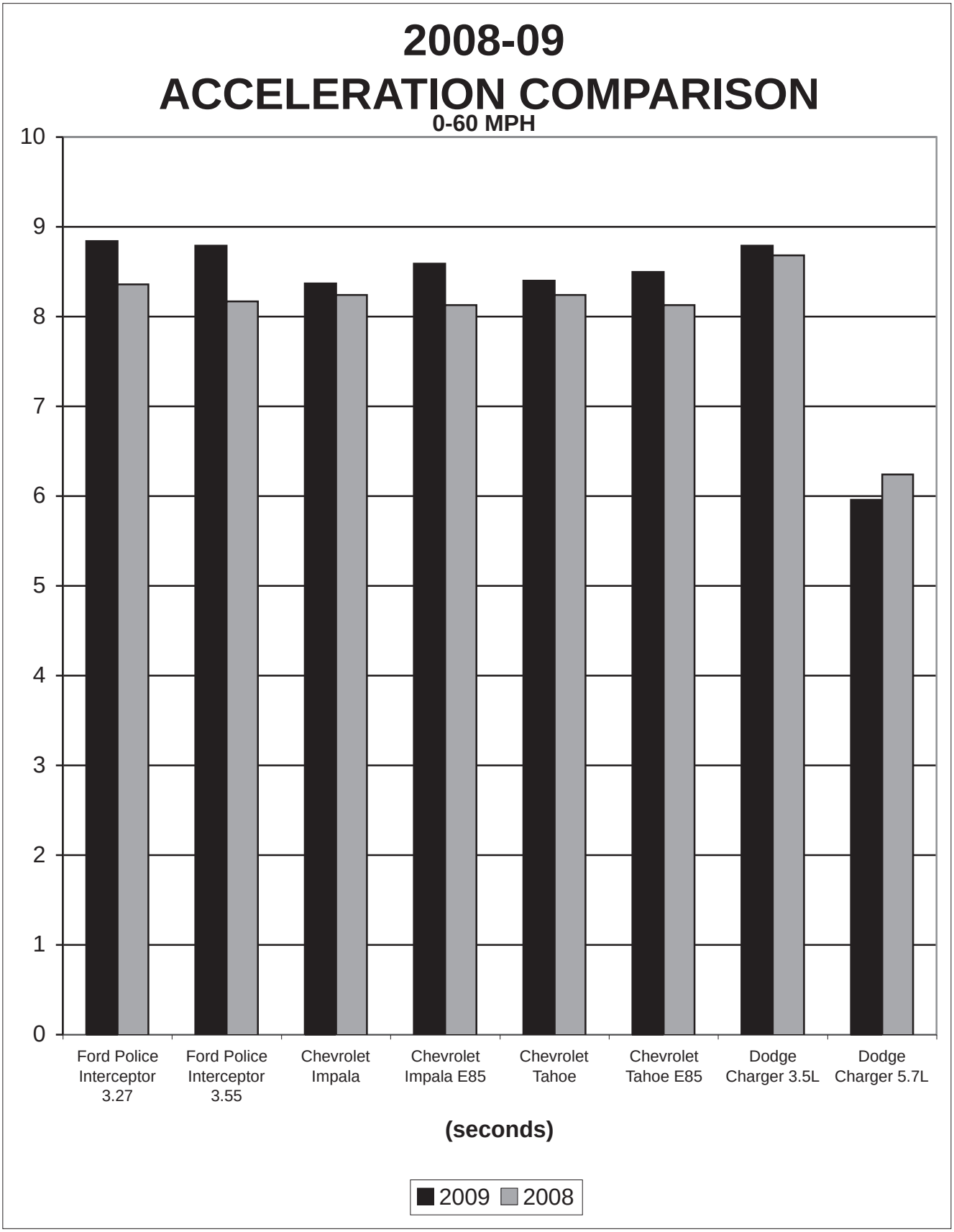
The acceleration, top speed, and brake testing of both the 2008 and 2009 model year vehicles were conducted in the latter half of September. Temperatures on the test day in September of 2007 ranged between 39.8° F at the start of testing to a high of approximately 57.5° F during the afternoon. Temperatures during the testing this year varied, ranging between 48.4° F when testing started, to an afternoon high of 81.1° F. Such things as temperature, humidity, and barometric pressure affect the performance of internal combustion engines and brake components, and may cause minor differences from one year's evaluation to the next.

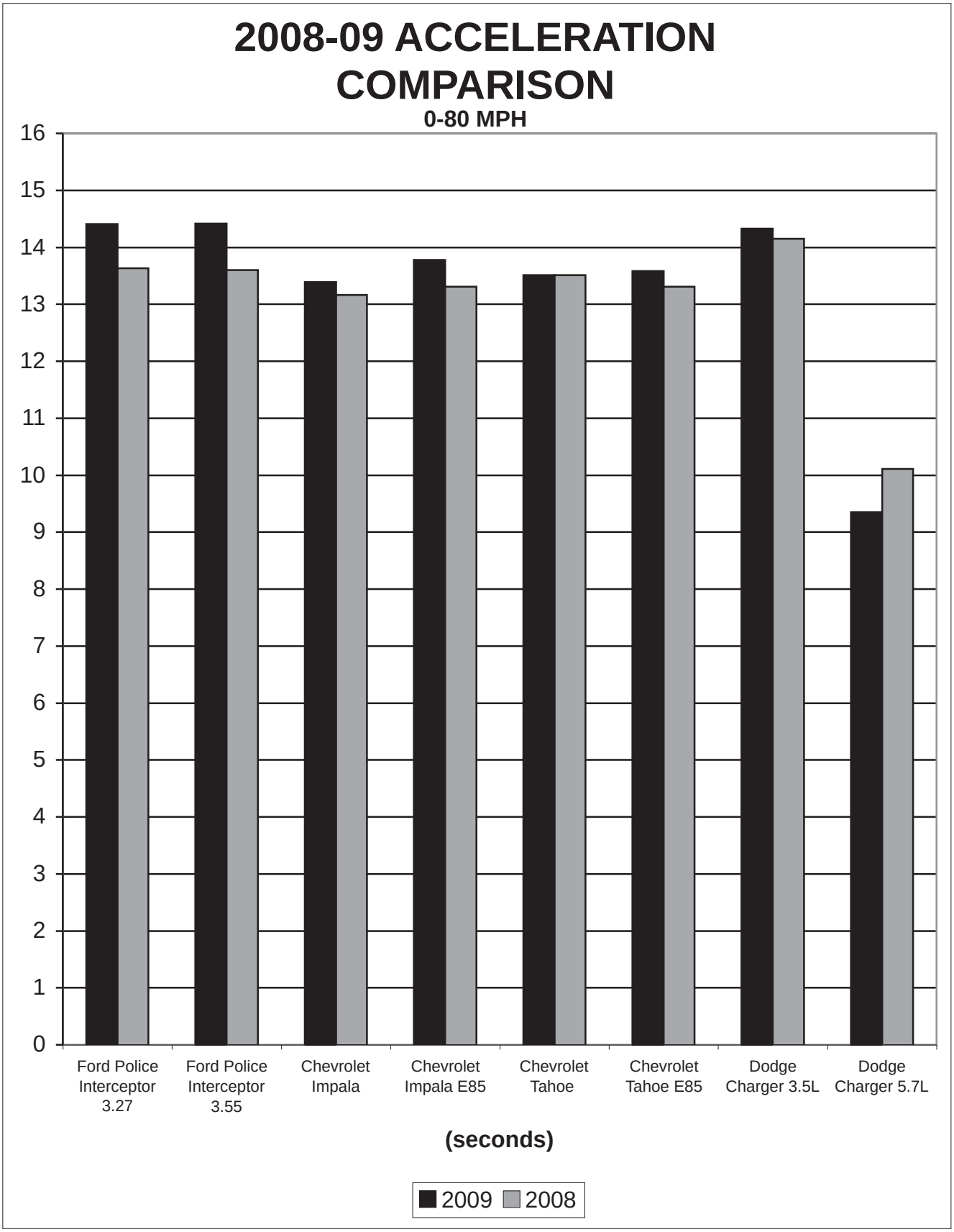
Another factor to be considered is the individual differences between two cars of the same make and model. The test cars that we evaluate are representative of their given make and model. Other cars of the same make and model will not, however, be exactly the same, particularly when it comes to performance. (It is well known that two consecutive cars off the same assembly line will perform slightly differently from each other.) Minor differences in performance from year to year within the same make and model are not only possible, but are to be expected.

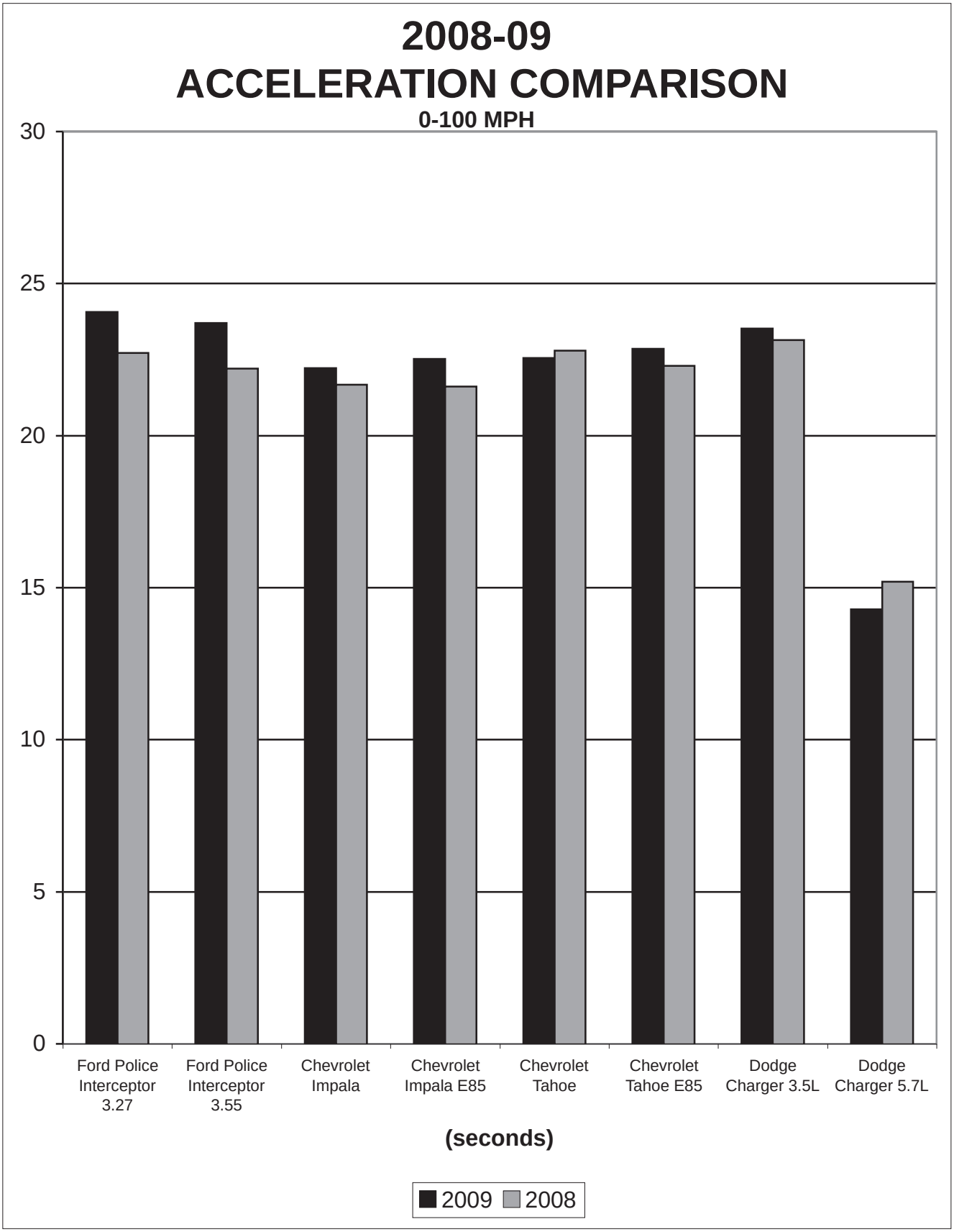
2008-09 Vehicle Dynamics Comparison

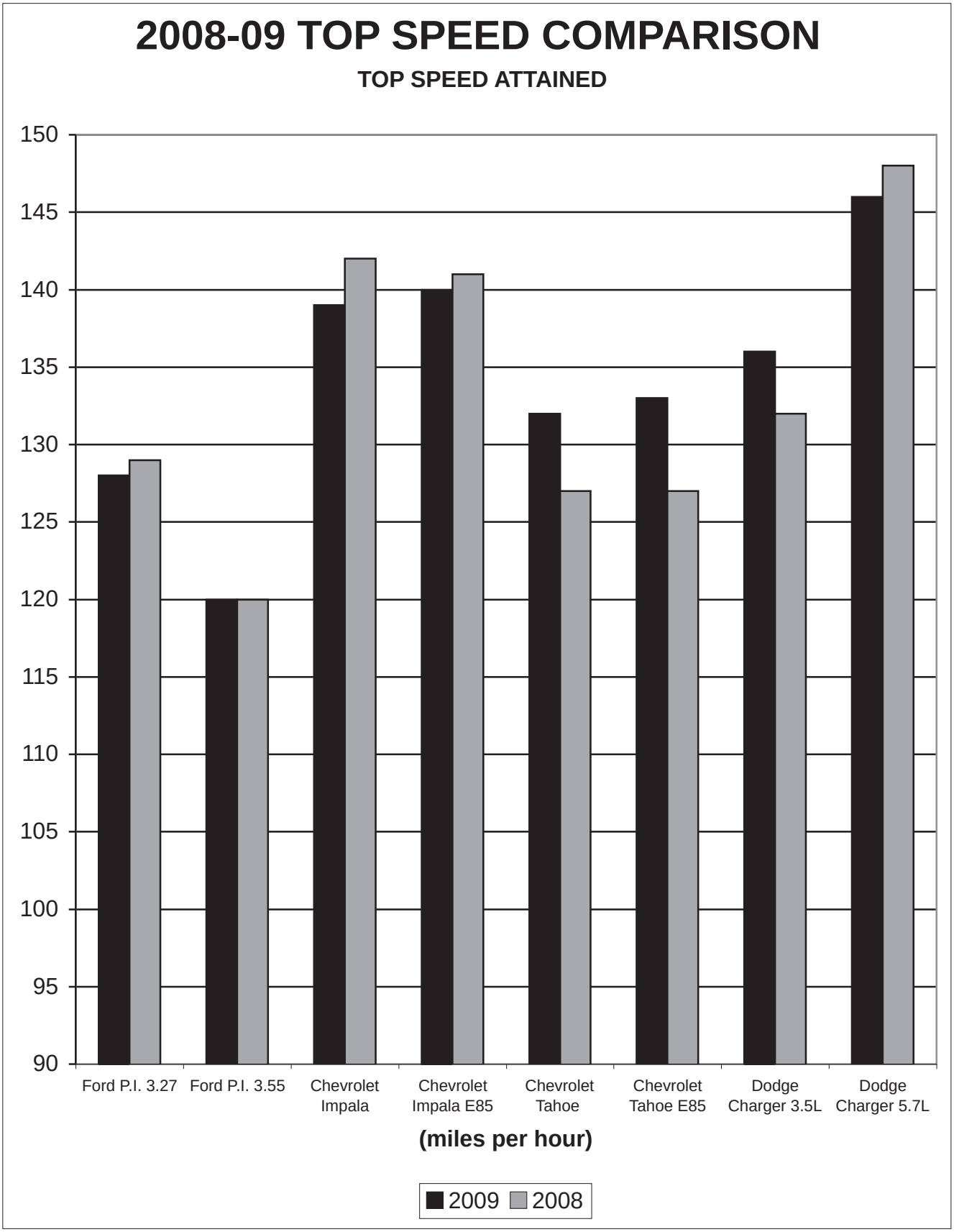
LAP TIMES

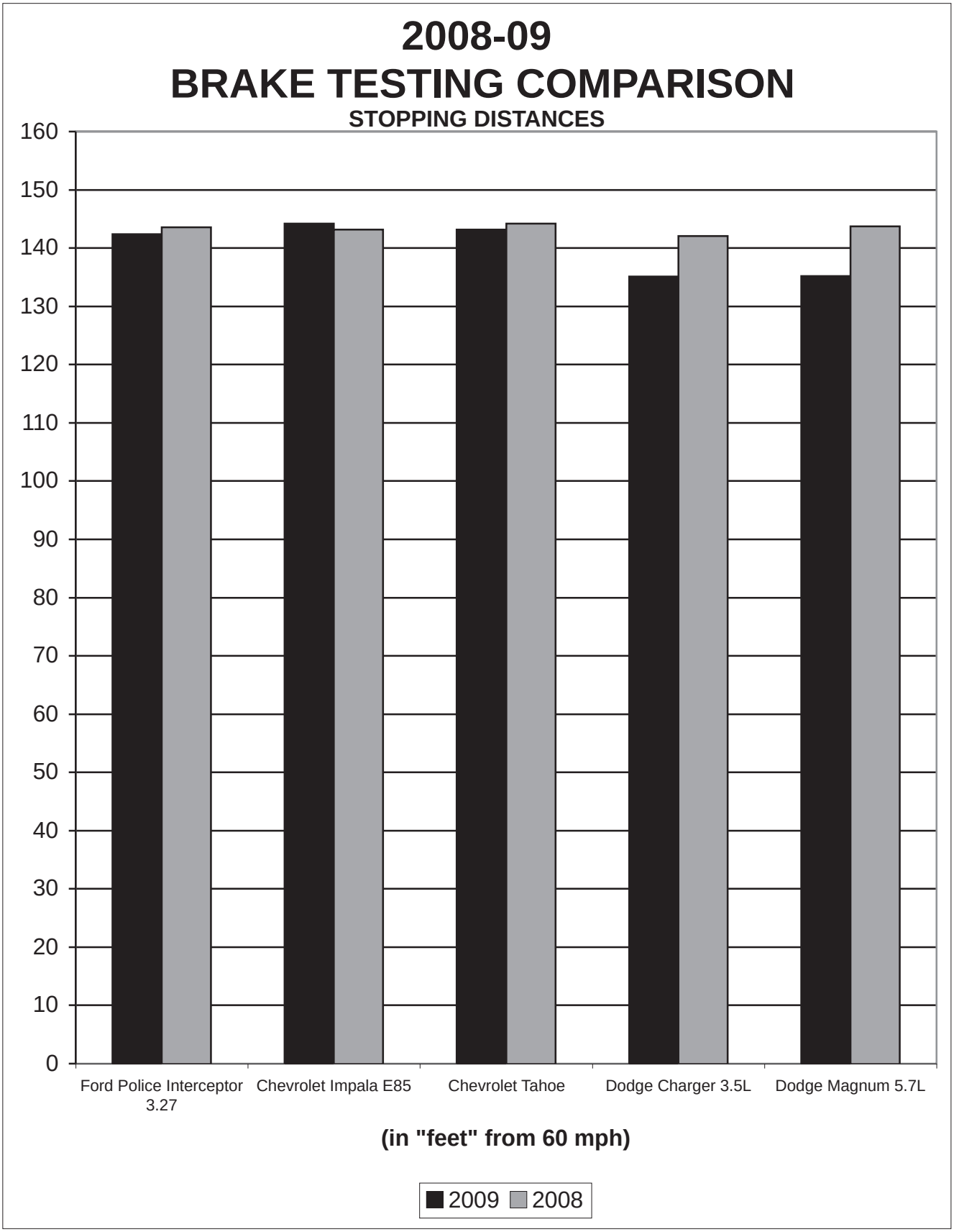



2008-09
ACCELERATION COMPARISON
0-60 MPH
10
9
8
7
6
5
4
3
2
1
0
Ford Police Interceptor 3.27
Ford Police Interceptor 3.55
Chevrolet Impala
Chevrolet Impala E85
Chevrolet Tahoe
Chevrolet Tahoe E85
Dodge Charger 3.5L
Dodge Charger 5.7L
(seconds)
2009
2008


2008-09 ACCELERATION COMPARISON
0-80 MPH
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Ford Police Interceptor 3.27
Ford Police Interceptor 3.55
Chevrolet Impala
Chevrolet Impala E85
Chevrolet Tahoe
Chevrolet Tahoe E85
Dodge Charger 3.5L
Dodge Charger 5.7L
(seconds)
2009
2008


2008-09
ACCELERATION COMPARISON
0-100 MPH
30
25
20
15
10
5
0
Ford Police Interceptor 3.27
Ford Police Interceptor 3.55
Chevrolet Impala
Chevrolet Impala E85
Chevrolet Tahoe
Chevrolet Tahoe E85
Dodge Charger 3.5L
Dodge Charger 5.7L
(seconds)
2009
2008


2008-09 TOP SPEED COMPARISON
TOP SPEED ATTAINED
150
145
140
135
130
125
120
115
110
105
100
95
90
Ford P.I. 3.27
Ford P.I. 3.55
Chevrolet Impala
Chevrolet Impala E85
Chevrolet Tahoe
Chevrolet Tahoe E85
Dodge Charger 3.5L
Dodge Charger 5.7L
(miles per hour)
2009
2008


2008-09
BRAKE TESTING COMPARISON
STOPPING DISTANCES
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Ford Police Interceptor 3.27
Chevrolet Impala E85
Chevrolet Tahoe
Dodge Charger 3.5L
Dodge Magnum 5.7L
(in "feet" from 60 mph)
2009
2008

MOTORCYCLES

Like many law enforcement agencies, the Michigan State Police used motorcycles up until late 1941 and then switched to automobiles. The Michigan State Police rekindled interest in motorcycles for day to day patrol operations in 1993. In 2004, Michigan State Police headquarters asked if we had additional information as a resource for our purchasing decisions regarding motorcycles. During that time, we were given direction to expand vehicle testing to include motorcycle testing. We are pleased to announce the third MSP police motorcycle test. We would like to thank Harley-Davidson and BMW for participating and providing their assistance in preparation for this year's successful testing program.

We are constantly evaluating our various tests with the manufacturers and the law enforcement industry to provide you with the most objective test data available. While there are many similarities to automobiles, there are also quite a few differences. Law enforcement motorcycles will encounter a variety of surfaces during patrol operations or emergencies. Because of that, we developed a braking test with substantially different coefficient of friction surfaces. An example of this in the real world would be if a motor officer was to run off the road and onto gravel or a wet grassy surface and had to brake at the same time.

When looking at the data, it is very important for the reader to apply your mission requirements to the motorcycle you are considering so you may make an appropriate decision. This report is not an endorsement of products, but a means of learning what's available for your officers so they can do their job more effectively and safely. If anything in this report requires further explanation or clarification, please call or write.

Harley Davidson Road King

TEST VEHICLE DESCRIPTION

MAKE Harley Davidson	**MODEL** FLHP		**SALES CODE NO.** N/A
ENGINE DISPLACEMENT	**CUBIC CENTIMETERS** 1690		**CUBIC INCHES** 103
FUEL SYSTEM	EFI		**EXHAUST** Crossover Dual
BORE & STROKE	3.875 x 4.375 in		**ALTERNATOR** 50 amp
TORQUE	102 ft-lbs		**BATTERY** 28 Amp Hour
COMPRESSION RATIO	9.6:1		
TRANSMISSION	**PRIMARY DRIVE** 34/46		**FINAL DRIVE** 32/68
GEAR RATIO	2.875 overall		
LEAN ANGLE	**LEFT** 31 Deg		**RIGHT** 33 Deg
CLUTCH	Wet multiple plate		
WHEELS/TIRES	Wheels/Slotted Disk Cast Aluminum front and rear / Front 17 x 3 / Rear 16 x 5 Tires / Front Dunlop D407F 130/80B17 Rear Dunlop D407 180/65B16		
FRONT SUSPENSION	**FORK ANGLE** 29.25°		**RAKE** 26°
REAR SUSPENSION	Swing Arm w/ Air Adjustable Shocks		
SUSPENSION TRAVEL	**FRONT** 4.6 in.		**REAR** 3.0 in.
GROUND CLEARANCE, MINIMUM	5.1 in.		
BRAKE SYSTEM	Hydraulic Disc / Independent Front & Rear ABS		
BRAKES, FRONT	**TYPE** Dual Disc		**SWEPT AREA** 180sq in.
BRAKES, REAR	**TYPE** Single Disc		**SWEPT AREA** 90sq in.
FUEL CAPACITY	**GALLONS** 6		**LITERS** 22.71
OIL CAPACITY	4 Qts		
GENERAL MEASUREMENTS	**WHEELBASE** 63.54 in.		**LENGTH** 95.14 in.
	TEST WEIGHT 839 lbs.		**OVERALL HEIGHT** 55.1 in.
	SEAT HEIGHT 30.0 in.		
EPA MILEAGE EST. (MPG)	**CITY** 35	**HIGHWAY** 54	**COMBINED** **44.5**

Harley Davidson Electra Glide

TEST VEHICLE DESCRIPTION

MAKE Harley Davidson	**MODEL** FLHTP		**SALES CODE NO.** N/A
ENGINE DISPLACEMENT	**CUBIC CENTIMETERS** 1690		**CUBIC INCHES** 103
FUEL SYSTEM	EFI		**EXHAUST** Crossover Dual
BORE & STROKE	3.875 x 4.375 in		**ALTERNATOR** 50 amp
TORQUE	102 ft-lbs		**BATTERY** 28 amp hour
COMPRESSION RATIO	9.6:1		
TRANSMISSION	**PRIMARY DRIVE** 34/46		**FINAL DRIVE** 32/68
GEAR RATIO	2.875 overall		
LEAN ANGLE	**LEFT** 31°		**RIGHT** 33°
CLUTCH	Wet multiple plate		
WHEELS/TIRES	Wheels / Slotted Disk Cast Aluminum front and rear / Front 17 x 3 / Rear 16 x 5 Tires / Front Dunlop D407F 130/80B 17 Rear Dunlop D407 180/65B16		
FRONT SUSPENSION	**FORK ANGLE** 29.25°		**RAKE** 26°
REAR SUSPENSION	Swing Arm w/ Air Adjustable Shocks		
SUSPENSION TRAVEL	**FRONT** 4.6 in.		**REAR** 3.0 in.
GROUND CLEARANCE, MINIMUM	5.1 in.		
BRAKE SYSTEM	Hydraulic Disc / Independent Front & Rear ABS		
BRAKES, FRONT	**TYPE** Dual Disc		**SWEPT AREA** 180sq in.
BRAKES, REAR	**TYPE** Single Disc		**SWEPT AREA** 90sq in.
FUEL CAPACITY	**GALLONS** 6.0		**LITERS** 22.71
OIL CAPACITY	4.0 Qts		
GENERAL MEASUREMENTS	**WHEELBASE** 63.54 in.		**LENGTH** 95.14 in.
	TEST WEIGHT 838 lbs.		**OVERALL HEIGHT** 61 in.
	SEAT HEIGHT 30 in.		
EPA MILEAGE EST. (MPG)	**CITY** 35	**HIGHWAY** 54	**COMBINED** 44.5

BMW R1200 RTP

TEST VEHICLE DESCRIPTION

MAKE BMW	**MODEL** R1200RT-P		**SALES CODE NO.** 08RB
ENGINE DISPLACEMENT	**CUBIC CENTIMETERS** 1170		**Engine** 2-Cylinder
FUEL SYSTEM	BMSK-P Injection		**EXHAUST** Stainless Steel with Catalytic Converter
BORE & STROKE	101 mm. x 73 mm.		**ALTERNATOR** 720 W
TORQUE	85 ft-lbs @ 6,000 rpm.		**BATTERY** 2 19 Amp Ah Gel Maintenance-Free
COMPRESSION RATIO	12.0:1		
TRANSMISSION	**PRIMARY DRIVE** Gear 1:1.882		**FINAL DRIVE** Shaft w/ring & pinion gear
GEAR RATIO	1:2.75 rear drive ratio		
LEAN ANGLE	**LEFT** 46°		**RIGHT** 46°
CLUTCH	Self-adjusting Hydraulic Actuating Single Plate Dry Clutch		
WHEELS/TIRES	Die-cast Aluminum MTH2 Rim Profile fitted with Run-Flat Tires (meets California Highway Patrol Run-Flat Protocol)/Tires Dunlop Sport Max F-120/70 ZR17 R-180/55 ZR17		
FRONT SUSPENSION	**FORK ANGLE** 63.4 BMW Telelever		**RAKE** Castor in normal position 4.3 in.
REAR SUSPENSION	BMW Evo Paralever		
SUSPENSION TRAVEL	**FRONT** 4.7 in.		**REAR** 5.3 in.
GROUND CLEARANCE, MINIMUM			
BRAKE SYSTEM	BMW/ABS Partially Integrated Brake System		
BRAKES, FRONT	**TYPE** Dual 12.6 in. Disc		**SWEPT AREA** 186 sq. in.
BRAKES, REAR	**TYPE** Single 10.4in. Disc		**SWEPT AREA** 62 sq. in.
FUEL CAPACITY	**GALLONS** 7.1		**LITERS** 27
OIL CAPACITY	4.0 Qts.		
GENERAL MEASUREMENTS	**WHEELBASE** 58.4 in.		**LENGTH** 87.8 in.
	TEST WEIGHT 680		**OVERALL HEIGHT** 56.3 in.
	***SEAT HEIGHT** 32.2 in.		
EPA MILEAGE EST. (MPG) (Based on DIN standard test)	**CITY** N/A	**HIGHWAY** 48 @ 75mph 65 @ 55mph	**COMBINED** N/A

*Seat height has two adjustment positions. A low seat is available making the seat height 31".

Buell Ulysses XB12XP

Test Vehicle Sheet

MAKE Buell	**MODEL** XB12XP		**SALES CODE NO.**
ENGINE DISPLACEMENT	**CUBIC CENTIMETERS** 1203		**ENGINE** Thunderstorm 45° V-twin / 4 stroke / air-oil-fan cooled
FUEL SYSTEM	49mm downdraft DDFI III FI		**EXHAUST** Two into One Underslung
BORE & STROKE	3.50 X 3.812		**ALTERNATOR** 30 Amp
TORQUE	84 ft-lbs. @ 6000 rpm		**BATTERY** 12V 12 amp/hour, 200CCA
COMPRESSION RATIO	10.0:1		
TRANSMISSION	**PRIMARY DRIVE** 57/38		**FINAL DRIVE** 65/27
GEAR RATIO	1st/2.648 2nd/1.892 3rd/1.407 4th/1.166 5th/1.000		
LEAN ANGLE	**LEFT** 39°		**RIGHT** 39°
CLUTCH	Wet multiple plate		
WHEELS/TIRES	Wheels / Reinforced Six Spoke Cast Aluminum front and rear Front 17 X 3.5 / Rear 17 X 5.5 Tires / Front Pirelli Scorpion Sync 120/70 ZR17 Rear Pirelli Scorpion Sync 180/55 ZR17		
FRONT SUSPENSION	**FORK ANGLE** 22°		**RAKE** 23.5°
REAR SUSPENSION	Showa Coil Over Monoshock with remote reservoir and remote spring preload adjust (fully adjustable / compression, damping, rebound damping and spring preload)		
SUSPENSION TRAVEL	**FRONT** 6.51 in.		**REAR** 6.38 in.
GROUND CLEARANCE, MINIMUM	6.97 in.		
BRAKE SYSTEM	Hydraulic / Disc front and rear		
BRAKES, FRONT	**TYPE** Single Disc		**SWEPT AREA** 50.1 sq in.
BRAKES, REAR	**TYPE** Single Disc		**SWEPT AREA** 34.4 sq in.
FUEL CAPACITY	**GALLONS** 4.4		**LITERS** 16.66
OIL CAPACITY	2.5 Qts.		
GENERAL MEASUREMENTS	**WHEELBASE** 54.08 in.		**LENGTH** 86.10 in.
	TEST WEIGHT 564		**OVERALL HEIGHT** n/a
	SEAT HEIGHT 31.80 in. / laden		
EPA MILEAGE EST. (MPG)	**CITY** 51	**HIGHWAY** 64	**COMBINED** 57.5

BMW G650 X Challenge

Test Vehicle Description

MAKE BMW	**MODEL** G 650 X-P		**SALES CODE NO.** 07F6
ENGINE DISPLACEMENT	**CUBIC CENTIMETERS** 652 cc		**ENGINE** 1-Cyl.
FUEL SYSTEM	BMS-C II Engine Management with Fuel Injection		**EXHAUST** Stainless Steel with Catalytic Converter
BORE & STROKE	100 mm x 83 mm		**ALTERNATOR** 280 W
TORQUE	44 ft-lbs 53 hp @ 7,500 rpm		**BATTERY** 10Ah AGM
COMPRESSION RATIO	11.5:1		
TRANSMISSION	**PRIMARY DRIVE** 37:72 teeth 1.946 Primary Gear Ratio		**FINAL DRIVE** Chain 15:47 teeth
GEAR RATIO	2.750 1st, 1.750 2nd, 1.131 3rd, 1.045 4th, 0.875 5th.		
LEAN ANGLE	**LEFT** 40°		**RIGHT** 40°
CLUTCH	Seven-disc oil-bath wet clutch		
WHEELS/TIRES	Spoke 1.60”x 21” 90/90 x 21 / 2.50”x 18” 140/80 x 18”/ Tires: Front 90/90x21 Tube, Rear 140/80x18 Tube, Metzler Sahara 3		
FRONT SUSPENSION	**FORK ANGLE** 61.5		**RAKE** 116.5 mm
REAR SUSPENSION	Air Damping System		
SUSPENSION TRAVEL	**FRONT** 10.6 in.		**REAR** 10.6 in.
GROUND CLEARANCE, MINIMUM	11.2 in.		
BRAKE SYSTEM	Hydraulic 2-channel ABS brake system. ABS disengageable		
BRAKES, FRONT	**TYPE** Single disc self-cleaning Wave design ABS		**SWEPT AREA**
BRAKES, REAR	**TYPE** Single disc self-cleaning wave design ABS		**SWEPT AREA**
FUEL CAPACITY	**GALLONS** 2.7		**LITERS** 9.5
OIL CAPACITY	2.4 Qts.		
GENERAL MEASUREMENTS	**WHEELBASE** 59.3 in.		**LENGTH** 86.8 in.
Note: GVWR 739 lbs.	**TEST WEIGHT** 385		**OVERALL HEIGHT**
	SEAT HEIGHT 37.2 in.		
EPA MILEAGE EST. (MPG)	**CITY**	**HIGHWAY**	**COMBINED**

TEST VEHICLE DESCRIPTION SUMMARY

	Harley Davidson FLHP	Harley Davidson FLHTP	BMW R-1200 RT-P
CUBIC CENTIMETERS	1690	1690	1170
ENGINE DISPLACEMENT – CU. IN.	103	103	2 cyl
ENGINE FUEL SYSTEM	EFI	EFI	Injection
EXHAUST	Crossover Dual	Crossover Dual	Stainless Steel
BORE & STROKE	3.875x4.375 (inches)	3.875x4.375 (inches)	101x73 (mm)
ALTERNATOR	50 amp	50 amp	720 watts
TORQUE - FT. LBS.	102	102	85
BATTERY	28	28	2x19
COMPRESSION RATIO	9.6:1	9.6:1	12.0:1
TRANSMISSION	6-Speed	6-Speed	6-Speed
PRIMARY DRIVE	34/46	34/46	1:1.882
FINAL DRIVE	32/68	32/68	Shaft w/ring & pinion
GEAR RATIO	2.875	2.875	1:2.75
LEAN ANGLE - LEFT	31°	31°	46°
LEAN ANGLE – RIGHT	33°	33°	46°
CLUTCH	Wet multi plate	Wet multi plate	Dry single plate
WHEELS/TIRES	3x16 MT/90-16 72H	3x16 MT/90-16 72H	Alum. MTH2
FORK ANGLE	29.25°	29.25°	63.4°
RAKE	26°	26°	4.3 in.
REAR SUSPENSION	Swing Arm	Swing Arm	EVO Paralever
SUSPENSION TRAVEL – FRONT	4.6 in.	4.6 in.	4.7 in.
SUSPENSION TRAVEL – BACK	3.0 in.	3.0 in.	5.3 in.
GROUND CLEARANCE-MINIMUM	5.1 in.	5.1 in.	
BRAKE SYSTEM	Disc.	Disc.	IABS
FRONT SWEPT AREA (sq. in.)	180	180	186
REAR SWEPT AREA (sq. in.)	90	90	62
FUEL CAPACITY – GALLONS	6	6	7.1
FUEL CAPACITY – LITERS	22.71	22.71	27
OIL CAPACITY – QUARTS	4	4	4
WHEELBASE	63.54	63.54	58.4
LENGTH	95.14	95.14	87.8
WEIGHT	839	838	680
OVERALL HEIGHT	55.1	61	56.3
SEAT HEIGHT	30	30	32.2
EPA MILEAGE – CITY	35	35	N/A
EPA MILEAGE - HIGHWAY	54	54	48 @ 75mph 65 @ 55mph

	Buell Ulysses	BMX X650 X-P
CUBIC CENTIMETERS	1203	652
ENGINE DISPLACEMENT – CU. IN.	4 stroke	1 cyl
ENGINE FUEL SYSTEM	DDFI III FI	BMS-C II FI
EXHAUST	Underslung	SS Catalytic Converter
BORE & STROKE	3.5 x 3.812	100mm x 83 mm
ALTERNATOR	30 amp	280 watt
TORQUE - FT. LBS.	84	44
BATTERY	12	10
COMPRESSION RATIO	10.0:1	11.5:1
TRANSMISSION	5-Speed	5-Speed
PRIMARY DRIVE	57/38	37:72/1.946
FINAL DRIVE	65/27	15:47
GEAR RATIO	1st/2.648 2nd/1.892 34d/1.407 4th/1.166 5th/1.000	2.750 1st, 1.750 2nd, 1.131 3rd, 1.045 4th, .875 5th
LEAN ANGLE - LEFT	39○	40°
LEAN ANGLE – RIGHT	39○	40°
CLUTCH	Wet Multi-Plate	7-Disk oil-bath wet clutch
WHEELS/TIRES	Alum Spoke F17 x 3.5 R17 x 5.5	Spoke F90/90 x 21 R140/80 x 18
FRONT SUSPENSION		
FORK ANGLE	22°	61.5°
RAKE	23.5°	116.5
REAR SUSPENSION	Coil over shock/Adjustable	Air Damping System
SUSPENSION TRAVEL – FRONT	6.51	10.6
SUSPENSION TRAVEL – BACK	6.38	10.6
GROUND CLEARANCE-MINIMUM	6.97	11.2
BRAKE SYSTEM	Hydraulic	Hydraulic
FRONT SWEPT AREA (sq. in.)	50.1	n/a
REAR SWEPT AREA (sq. in.)	34.4	n/a
FUEL CAPACITY – GALLONS	4.4	2.7
FUEL CAPACITY – LITERS	16.66	9.5
OIL CAPACITY – QUARTS	2.5	2.4
WHEELBASE	54.08	59.3
LENGTH	86.10	86.8
WEIGHT	564	385
OVERALL HEIGHT	N/A	n/a
SEAT HEIGHT	31.8	37.2
EPA MILEAGE – CITY	51	
EPA MILEAGE - HIGHWAY	64	

MOTORCYCLE DYNAMICS TESTING

MOTORCYCLE DYNAMICS TEST OBJECTIVE

Determine each motorcycle's high speed handling characteristics and performance in comparison to other motorcycles. The course used contains 9 turns and curves (including a 90 degree left turn, a switch back, a sweeping turn, a high speed turn and a decreasing radius, with different braking requirements) and is 1 mile in length. The course simulates actual conditions encountered in pursuit or emergency driving situations in the field, with the exception of other traffic. The evaluation is a true test of the vehicle manufacturers in offering balanced packages of acceleration capabilities, suspension components, and braking characteristics.

MOTORCYCLE DYNAMICS TEST METHODOLOGY

Each motorcycle is driven using four separate riders for a six lap series. The best 5 out of six laps for each rider will be totaled for a cumulative time. The cumulative time is the score for each driver. The final score of each motorcycle is the combined average from the four rider's cumulative times.

MOTORCYCLE DYNAMICS

VEHICLES	DRIVERS	COMBINED CUMULATIVE
Harley Davidson	GROMAK	6:12.20
FLHTP	JOHNSON	6:13.90
Electra Glide	TRAMMEL	6:19.50
	FLEGEL	6:11.40
Overall Average		6:14.25
Harley Davidson	GROMAK	6:08.50
FLHP	JOHNSON	6:11.00
Road King	TRAMMEL	6:20.00
	FLEGEL	6:09.40
Overall Average		6:12.23
BMW	GROMAK	5:44.40
R1200RTP	JOHNSON	5:48.30
	TRAMMEL	5:55.10
	FLEGEL	5:42.60
Overall Average		5:47.60
BMW	GROMAK	5:39.70
650 XP	JOHNSON	5:40.10
	TRAMMEL	5:58.80
	FLEGEL	5:33.70
Overall Average		5:43.08
Buell Ulysses	GROMAK	5:26.80
	JOHNSON	5:36.90
	TRAMMEL	5:50.40
	FLEGEL	5:32.10
Overall Average		5:36.55

MOTORCYCLE ACCELERATION AND TOP SPEED TESTING

ACCELERATION TEST OBJECTIVE

Determine the ability of each test motorcycle to accelerate from a standing start to 60 mph, 80 mph, and 100 mph, and determine the distance to reach 110 mph and 120 mph.

ACCELERATION TEST METHODOLOGY

Using a Correvit L-350 1 Axis Optical Sensor, each motorcycle is driven through four acceleration sequences, two northbound and two southbound, to allow for wind direction. The four resulting times for each target speed are averaged and the average times used to derive scores on the competitive test for acceleration.

TOP SPEED TEST OBJECTIVE

Determine the actual top speed attainable by each test motorcycle within a distance of 10 miles from a standing start.

TOP SPEED TEST METHODOLOGY

Following the fourth acceleration run, each test motorcycle will continue to accelerate to the top speed attainable within 10 miles from the start of the run. The highest speed attained within the 10-mile distance will be the vehicle's score on the competitive test for top speed.

SUMMARY OF ACCELERATION & TOP SPEED

ACCELERATION*		Harley Davidson Electra Glide	BMW R1200 RTP	Harley Davidson Road King	Buell Ulysses	BMW G650 XChallenge
0 – 20 mph	(sec.)	1.30	1.30	1.72	1.60	1.39
0 – 30 mph	(sec.)	2.00	1.98	2.73	2.41	2.06
0 – 40 mph	(sec.)	2.83	2.62	4.20	3.20	3.07
0 – 50 mph	(sec.)	3.85	3.54	5.56	4.11	4.09
0 – 60 mph	(sec.)	5.31	4.41	7.56	5.15	5.58
0 – 70 mph	(sec.)	6.85	5.67	9.72	6.47	7.42
0 – 80 mph	(sec.)	9.09	7.15	12.91	8.15	10.16
0 – 90 mph	(sec.)	12.22	8.82	17.13	10.04	15.27
0 – 100 mph	(sec.)	28.13	11.27	30.02	13.58	
TOP SPEED	**(mph)**	104	130	105	106	101
QUARTER MILE						
Time	(sec.)	15.74	13.10	15.87	13.87	14.63
Speed	(mph)	88.08	106.11	87.37	100.80	88.92

BRAKE TESTING

BRAKE TEST OBJECTIVE

Determine the deceleration rate attained by each test motorcycle on twelve 60 – 0 mph impending skid (threshold) stops, with ABS in operation if the motorcycle is so equipped. Each bike will be scored on the average deceleration rate it attains.

BRAKE TEST METHODOLOGY

Each motorcycle makes two decelerations at specific predetermined points on the test road from 90 – 0 mph at 22 ft/s^2, with the rider using a decelerometer to maintain the deceleration rate. Immediately after these "heat-up" stops are completed, the motorcycle turns around and makes six measured 60 – 0 mph impending skid (threshold) stops with ABS in operation, if so equipped, at specific predetermined points. The entire sequence is repeated. The exact initial velocity at the beginning of each of the 60 – 0 mph decelerations, and the exact distance required to make each stop, is recorded by means of a non contact optical sensor in conjunction with electronic speed and distance meters. The data resulting from the twelve total stops is used to calculate the average deceleration rate which is the motorcycle's score for this test.

DECELERATION RATE FORMULA

$$\text{Deceleration Rate (DR)} = \frac{\text{Initial Velocity*(IV) squared}}{\text{2 times Stopping Distance (SD)}} = \frac{(IV)^2}{2\,(SD)}$$

EXAMPLE:

Initial Velocity = 89.175 ft/s (60.8 mph x 1.4667*)
Stopping Distance = 171.4 ft.

$$DR = \frac{(IV)^2}{2(SD)} = \frac{(89.175)^2}{2(171.4)} = \frac{7952.24}{342.8} = 23.198 \text{ ft/s}^2$$

Once a motorcycle's average deceleration rate has been determined, it is possible to calculate the stopping distance from any given speed by utilizing the following formula:

Select a speed; translate that speed into feet per second; square the feet per second figure by multiplying it by itself; divide the resultant figure by 2; divide the remaining figure by the average deceleration rate of the motorcycle in question.

EXAMPLE:

60 mph = 88.002 ft/s x 88.002 = 7744.352 / 2 = 3872.176 / 23.198 ft/s^2 = 166.9 ft.

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds **DATE:** September 20, 2008

BEGINNING Time: 2:27 p.m. **TEMPERATURE:** 80.9°F

MAKE & MODEL: Harley Davidson Electra Glide FLHTP **BRAKE SYSTEM:** Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.29 mph	166.34 feet	23.50 ft/s^2
Stop #2	60.13 mph	160.90 feet	24.17 ft/s^2
Stop #3	60.76 mph	176.70 feet	22.47 ft/s^2
Stop #4	59.97 mph	166.73 feet	23.20 ft/s^2
Stop #5	61.05 mph	188.64 feet	21.25 ft/s^2
Stop #6	59.71 mph	158.18 feet	24.24 ft/s^2

AVERAGE DECELERATION RATE 23.14 ft/s^2

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.69 mph	163.41 feet	24.24 ft/s^2
Stop #2	59.50 mph	159.72 feet	23.84 ft/s^2
Stop #3	61.01 mph	162.47 feet	24.64 ft/s^2
Stop #4	59.87 mph	156.04 feet	24.71 ft/s^2
Stop #5	60.28 mph	157.63 feet	24.79 ft/s^2
Stop #6	59.90 mph	155.74 feet	24.78 ft/s^2

AVERAGE DECELERATION RATE 24.50 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 23.82 ft/s^2

Projected Stopping Distance from 60.0 mph 162.6

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds

DATE: September 20, 2008

BEGINNING Time: 12:47 p.m.

TEMPERATURE: 78.7°F

MAKE & MODEL: BMW R1200RTP

BRAKE SYSTEM: Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	61.82 mph	151.85 feet	27.07 ft/s^2
Stop #2	61.60 mph	162.95 feet	25.05 ft/s^2
Stop #3	59.44 mph	138.77 feet	27.39 ft/s^2
Stop #4	59.48 mph	148.63 feet	25.60 ft/s^2
Stop #5	60.04 mph	149.35 feet	25.96 ft/s^2
Stop #6	59.88 mph	141.42 feet	27.27 ft/s^2

AVERAGE DECELERATION RATE 26.39 ft/s^2

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	61.04 mph	145.38 feet	27.57 ft/s^2
Stop #2	61.47 mph	157.99 feet	25.72 ft/s^2
Stop #3	59.59 mph	142.76 feet	26.75 ft/s^2
Stop #4	59.58 mph	149.16 feet	25.60 ft/s^2
Stop #5	59.40 mph	151.25 feet	25.09 ft/s^2
Stop #6	60.45 mph	152.29 feet	25.81 ft/s^2

AVERAGE DECELERATION RATE 26.09 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 26.24 ft/s^2

Projected Stopping Distance from 60.0 mph 147.6

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds

DATE: September 20, 2008

BEGINNING Time: 2:39 p.m.

TEMPERATURE: 78.7°F

MAKE & MODEL: Harley Davidson Road King FLHP

BRAKE SYSTEM: Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.55 mph	172.80 feet	22.82 ft/s^2
Stop #2	60.54 mph	170.63 feet	23.10 ft/s^2
Stop #3	59.99 mph	171.40 feet	22.58 ft/s^2
Stop #4	59.91 mph	166.65 feet	23.17 ft/s^2
Stop #5	59.67 mph	170.91 feet	22.41 ft/s^2
Stop #6	60.36 mph	165.39 feet	23.69 ft/s^2

AVERAGE DECELERATION RATE 22.96 ft/s^2

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.37 mph	167.55 feet	23.40 ft/s^2
Stop #2	60.21 mph	174.78 feet	22.31 ft/s^2
Stop #3	59.96 mph	178.66 feet	21.64 ft/s^2
Stop #4	61.09 mph	166.94 feet	24.05 ft/s^2
Stop #5	59.01 mph	172.00 feet	21.78 ft/s^2
Stop #6	60.64 mph	168.65 feet	23.45 ft/s^2

AVERAGE DECELERATION RATE 22.77 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 22.87 ft/s^2

Projected Stopping Distance from 60.0 mph 169.3

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds

DATE: September 20, 2008

BEGINNING Time: 5:57 p.m.

TEMPERATURE: 77.8°F

MAKE & MODEL: Buell Ulysses

BRAKE SYSTEM: Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	59.35 mph	154.19 feet	24.57 ft/s^2
Stop #2	60.24 mph	156.74 feet	24.90 ft/s^2
Stop #3	60.24 mph	158.16 feet	24.68 ft/s^2
Stop #4	59.67 mph	156.01 feet	24.55 ft/s^2
Stop #5	59.93 mph	158.40 feet	24.39 ft/s^2
Stop #6	58.57 mph	149.65 feet	24.66 ft/s^2

AVERAGE DECELERATION RATE 24.62 ft/s^2

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	56.26 mph	131.90 feet	25.81 ft/s^2
Stop #2	59.55 mph	154.80 feet	24.64 ft/s^2
Stop #3	60.27 mph	153.68 feet	25.42 ft/s^2
Stop #4	60.12 mph	165.50 feet	23.49 ft/s^2
Stop #5	59.51 mph	157.56 feet	24.18 ft/s^2
Stop #6	59.52 mph	153.53 feet	24.82 ft/s^2

AVERAGE DECELERATION RATE 24.73 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 24.68 ft/s^2

Projected Stopping Distance from 60.0 mph 156.9

BRAKE TESTING

TEST LOCATION: Chrysler Proving Grounds

DATE: September 20, 2008

BEGINNING Time: 4:03 p.m.

TEMPERATURE: 80.2°F

MAKE & MODEL: BMX G650XChallenge

BRAKE SYSTEM: Anti-lock

Phase I

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	59.15 mph	166.44 feet	22.61 ft/s^2
Stop #2	60.35 mph	164.01 feet	23.89 ft/s^2
Stop #3	60.61 mph	174.85 feet	22.60 ft/s^2
Stop #4	60.41 mph	151.54 feet	25.90 ft/s^2
Stop #5	60.91 mph	155.21 feet	25.71 ft/s^2
Stop #6	60.04 mph	148.05 feet	26.19 ft/s^2

AVERAGE DECELERATION RATE 24.48 ft/s^2

Phase II

BRAKE HEAT-UP: (Two 90 –0 mph decelerations @ 22 ft.sec.$^{2)}$
TEST: (Six 60 – mph impending skid (ABS) maximum deceleration rate stops)

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	60.84 mph	159.64 feet	24.94 ft/s^2
Stop #2	60.20 mph	154.81 feet	25.18 ft/s^2
Stop #3	59.96 mph	152.35 feet	25.38 ft/s^2
Stop #4	59.69 mph	150.78 feet	25.42 ft/s^2
Stop #5	61.06 mph	161.17 feet	24.88 ft/s^2
Stop #6	60.66 mph	148.91 feet	26.58 ft/s^2

AVERAGE DECELERATION RATE 25.40 ft/s^2

Phase III

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes
Vehicle stopped within correct lane?	Yes

OVERALL AVERAGE DECEL. RATE: 24.94 ft/s^2

Projected Stopping Distance from 60.0 mph 155.3

HIGH TO LOW Um TRANSITION ANTI-LOCK BRAKE SYSTEM TEST

TEST OBJECTIVE

Determine the deceleration rate attained by each test motorcycle during the best five out of six 40-0 mph ABS panic stops on a transitional brake surface.

TEST METHODOLOGY

The motorcycle is accelerated to 40 mph and both brakes (front and rear) applied simultaneously to simulate an ABS panic stop. The initial deceleration begins on a dry asphalt surface (with a .85 coefficient of friction-high uM) and transitions 30 feet further to a wet seal coated skid pad surface (with a .33 coefficient of friction-low uM). The exact initial velocity at the beginning of each 40 mph – 0 decelerations and the exact distance required to make each stop is recorded by means of a non contact optical sensor measuring speed and distance. The data from the best 5 out of 6 total stops is used to calculate the average deceleration rate which is the vehicle's score for this test.

TEST LOCATION: Precision Driving Unit, Lansing

DATE: September 18, 2008

BEGINNING TIME: 3:01 p.m.

TEMPERATURE: 68°F

MAKE & MODEL: Harley Davidson FLHTP-Electra Glide

BRAKE SYSTEM: Anti-lock

Phase I

TEST: Determine the deceleration rate attained by each test motorcycle during the best five out of six 40-0 mph ABS panic stops on a transitional brake surface.

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	39.93 mph	141.37 feet	12.13 ft/s^2
Stop #2	39.57 mph	142.81 feet	11.79 ft/s^2
Stop #3	39.58 mph	128.45 feet	13.12 ft/s^2
Stop #4	39.85 mph	145.65 feet	11.73 ft/s^2
Stop #5	39.05 mph	135.47 feet	12.11 ft/s^2

AVERAGE DECELERATION RATE **12.18 ft/s^2**

Phase II

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes

Projected Stopping Distance from 40.0 mph 141.4

HIGH TO LOW Um TRANSITION ANTI-LOCK BRAKE SYSTEM TEST

TEST LOCATION: Precision Driving Unit, Lansing **DATE:** September 18, 2008

BEGINNING TIME: 3:31 p.m. **TEMPERATURE:** 68°F

MAKE & MODEL: Harley Davidson FLHP-Road King **BRAKE SYSTEM:** Anti-lock

Phase I

TEST: Determine the deceleration rate attained by each test motorcycle during the best five out of six 40-0 mph ABS panic stops on a transitional brake surface.

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	39.83 mph	134.19 feet	12.72 ft/s^2
Stop #2	40.74 mph	163.12 feet	10.94 ft/s^2
Stop #3	41.31 mph	165.04 feet	11.12 ft/s^2
Stop #4	40.59 mph	167.17 feet	10.60 ft/s^2
Stop #5	39.85 mph	163.46 feet	10.45 ft/s^2

AVERAGE DECELERATION RATE 11.17 ft/s^2

Phase II

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes

Projected Stopping Distance from 40.0 mph 154.1

BEGINNING TIME: 4:02 p.m. **TEMPERATURE:** 68°F

MAKE & MODEL: BMW R1200RTP **BRAKE SYSTEM:** Anti-lock

Phase I

TEST: Determine the deceleration rate attained by each test motorcycle during the best five out of six 40-0 mph ABS panic stops on a transitional brake surface.

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	40.95 mph	126.05 feet	14.31 ft/s^2
Stop #2	39.78 mph	108.81 feet	15.64 ft/s^2
Stop #3	40.55 mph	116.36 feet	15.20 ft/s^2
Stop #4	40.03 mph	117.36 feet	14.69 ft/s^2
Stop #5	40.02 mph	124.86 feet	13.80 ft/s^2

AVERAGE DECELERATION RATE 14.73 ft/s^2

Phase II

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes

Projected Stopping Distance from 40.0 mph 116.9

HIGH TO LOW Um TRANSITION ANTI-LOCK BRAKE SYSTEM TEST

TEST LOCATION: Precision Driving Unit, Lansing

DATE: September 18, 2008

BEGINNING Time: 4:33 p.m.

TEMPERATURE: 68°F

MAKE & MODEL: BMW G650X

BRAKE SYSTEM: Anti-lock

Phase I

TEST: Determine the deceleration rate attained by each test motorcycle during the best five out of six 40-0 mph ABS panic stops on a transitional brake surface.

	Initial Velocity	Stopping Distance	Deceleration Rate
Stop #1	38.60 mph	91.36 feet	17.54 ft/s^2
Stop #2	40.21 mph	114.66 feet	15.17 ft/s^2
Stop #3	39.06 mph	103.28 feet	15.89 ft/s^2
Stop #4	39.91 mph	109.47 feet	15.65 ft/s^2
Stop #5	40.05 mph	108.92 feet	15.84 ft/s^2

AVERAGE DECELERATION RATE **16.02 ft/s^2**

Phase II

	Yes/No
Evidence of severe fading?	No
Vehicle stopped in straight line?	Yes

Projected Stopping Distance from 40.0 mph 107.4

COMMUNICATIONS

TEST OBJECTIVE

Rate each test motorcycle's ability to:

Accommodate the required communications and emergency warning equipment and assess the relative difficulty of such installations.

TEST METHODOLOGY

The installation and communications portion of the evaluation will be conducted by personnel from DIT Communications based upon the relative difficulty of the necessary installations. Each factor will be graded on a 1 to 10 scale, with 1 representing "totally unacceptable," 5 representing "average," and 10 representing "superior." The scores will be averaged to minimize personal prejudice for or against any given motorcycle.

	BMW R1200RTP	FLHP ROAD KING	FLHTP ELECTRA GLIDE	Buell Ulysses XB12XP	BMW G650 XP
Dash Access					
Ignition Fuse terminal block	4.50	7.00	7.00	7.00	3.50
Radio-Siren Mounting location	7.00	7.00	7.00	7.00	3.50
Radio-Installation	6.00	5.50	6.50	4.50	4.50
Radio Box Position	7.00	5.50	8.00	5.00	3.00
Emergency Lights	8.00	8.00	8.00	7.50	7.50
Radio Interference	8.00	8.00	8.00	7.50	7.50
Radio Box					
Radio Installation	7.50	7.00	7.00	6.00	1.50
Antenna Installation	5.50	6.00	6.00	5.00	2.50
Emergency Lights Installation	8.00	7.50	7.50	7.50	7.50
Engine Access					
Radio Power Conn.	7.50	5.50	5.50	7.50	4.00
Power/Cont.Cable	6.50	4.50	4.50	5.50	3.50
TOTAL	**75.50**	**71.50**	**75.00**	**70.00**	**48.50**

About the National Institute of Justice

NIJ is the research, development, and evaluation agency of the U.S. Department of Justice. The Institutes's mission is to advance scientific research, development and evaluation to enhance the administration of justice and public safety. NIJ's principal authorities are derived from the Omnibus Crime Control and Safe Streets Act of 1968, as amended (see 42 USC §§ 3721–3723).

The NIJ Director is appointed by the President and confirmed by the Senate. The Director establishes the Institute's objectives, guided by the priorities of the Office of Justice Programs, the U.S. Department of Justice, and the needs of the field. The Institute actively solicits the views of criminal justice and other professionals and researchers to inform its search for the knowledge and tools to guide policy and practice.

Strategic Goals

NIJ has seven strategic goals grouped into three categories:

Creating relevant knowledge and tools

1. Partner with State and local practitioners and policymakers to identify social science research and technology needs.
2. Create scientific, relevant, and reliable knowledge—with a particular emphasis on terrorism, violent crime, drugs and crime, cost-effectiveness, and community-based efforts—to enhance the administration of justice and public safety.
3. Develop affordable and effective tools and technologies to enhance the administration of justice and public safety.

Dissemination

4. Disseminate relevant knowledge and information to practitioners and policymakers in an understandable, timely, and concise manner.
5. Act as an honest broker to identify the information, tools, and technologies that respond to the needs of stakeholders.

Agency management

6. Practice fairness and openness in the research and development process.
7. Ensure professionalism, excellence, accountability, cost-effectiveness, and integrity in the management and conduct of NIJ activities and programs.

Program Areas

In addressing these strategic challenges, the institute is involved in the following program areas: crime control and prevention, including policing; drugs and crime; justice systems and offender behavior, including corrections; violence and victimization; communications and information technologies; critical incident response; investigative and forensic sciences, including DNA; less than lethal technologies; officer protection; education and training technologies; testing and standards; technology assistance to law enforcement and corrections agencies; field testing of promising programs; and international crime control.

In addition to sponsoring research and development and technology assistance, NIJ evaluates programs, policies and technologies. NIJ communicates its research and evaluation findings through conferences and print and electronic media.

About the Law Enforcement and Corrections Standards and Testing Program

The Law Enforcement and Corrections Standards and Testing Program is sponsored by the Office of Science and Technology of the National Institute of Justice (NIJ), U.S. Department of Justice. The program responds to the mandate of the Justice System Improvement Act of 1979, which directed NIJ to encourage research and development to improve the criminal justice system and to disseminate the results to Federal, State and local agencies.

The Law Enforcement and Corrections Standards and Testing Program is an applied research effort that determines the technological needs of justice system agencies, sets minimum performance standards for specific devices, tests commercially available equipment against those standards, and disseminates the standards and the test results to criminal justice agencies nationwide and internationally.

The program operates through the following:

- The **Law Enforcement and Corrections Technology Advisory Council** (LECTAC), consisting of nationally recognized criminal justice practitioners from Federal, State, and local agencies, assesses technological needs and sets priorities for research programs and items to be evaluated and tested.

- The **Office of Law Enforcement Standards** (OLES) at the National Institute of Standards and Technology develops voluntary national performance standards for compliance testing to ensure that individual items of equipment are suitable for use by criminal justice agencies. The equipment standards developed by OLES are based on laboratory evaluation of commercially available products in order to devise precise test methods that can be universally applied by any qualified testing laboratory and to establish minimum performance requirements for each attribute of a piece of equipment that is essential to how it functions. OLES-developed standards can serve as design criteria for manufacturers or as the basis for equipment evaluation. The application of the standards, which are highly technical in nature, is augmented through the publication of equipment performance reports and user guides. Individual jurisdictions may use the standards in their own laboratories to test equipment, have equipment tested on their behalf using the standards, or cite the standards in procurement specifications.

- The **National Law Enforcement and Corrections Technology Center** (NLECTC), operated by a grantee, supervises a national compliance testing program conducted by independent laboratories. The standards developed by OLES serve as performance benchmarks against which commercial equipment is measured. The facilities, personnel, and testing capabilities of the independent laboratories are evaluated by OLES prior to testing each item of equipment. In addition, OLES helps NLECTC staff review and analyze data. Test results are published in consumer product reports designed to help justice system procurement officials make informed purchasing decisions.

Publications are available at no charge through NLECTC. Some documents are also available online through the Justice Technology Information Network (JUSTNET), the center's Internet/World Wide Web site. To request a document or additional information, call 800–248–2742 or 301–519–5060, or write:

National Law Enforcement and Corrections Technology Center
2277 Research Boulevard
Mail Stop 8J
Rockville, MD 20850
E-mail: *asknlectc@nlectc.org*
World Wide Web address: *http://www.justnet.org*

About the National Law Enforcement and Corrections Technology Center System

The National Law Enforcement and Corrections Technology Center (NLECTC) system exists to support the Nation's structure of state and local law enforcement and corrections. The United States has more than 18,000 law enforcement agencies, 50 State correctional systems and thousands of prisons and jails. The fragmented nature of law enforcement and corrections impedes the dissemination of valuable new information, fosters a patchwork marketplace that discourages the commercialization of new technologies, and underscores the need for uniform performance standards for equipment and technologies.

The National Institute of Justice's (NIJ's) Office of Science and Technology (OS&T) created NLECTC in 1994 as a national system of technology centers that are clearinghouses of information and sources of technology assistance and that also attend to special needs, including standards development.

The NLECTC system's purpose is to determine the needs of the law enforcement and corrections communities and assist them in understanding, using and benefitting from new and existing technologies that, increasingly, are vital levers of progress in criminal justice. NIJ/OS&T and the NLECTC system are the only current programs developed by the federal government that focus solely on the development and transfer of technologies to state and local law enforcement and corrections.

NLECTC is a program of NIJ, the research and development arm of the U.S. Department of Justice. The system currently consists of a national center, five regional centers, several specialty centers, and four Centers of Excellence. Also contributing to the initiatives of the center system is the Office of Law Enforcement Standards. The centers are co-located with a host organization or agency that specializes in one or more areas of technology research and development.

The National Center, located in Rockville, Maryland, is the system's information hub. Regional centers are currently located in Alaska, California, Colorado, New York, and South Carolina. Specialty centers located around the country deal with border matters (California), rural law enforcement issues (Kentucky), and standards and testing (Maryland). The Centers of Excellence specialize in communications technologies; forensics; sensors, surveillance, and biometrics; and weapons and protective systems.

Each center shares roles with the other centers and has distinctive characteristics. All are focused on helping law enforcement and corrections take full advantage of technology's rapidly growing capacity to serve the purposes of crime control and the criminal justice system.

A national body of criminal justice professionals, the Law Enforcement and Corrections Technology Advisory Council (LECTAC), helps identify research and development priorities, thereby influencing the work of the NLECTC system. In addition, each NLECTC center has a regional advisory council of law enforcement and corrections officials. Together, LECTAC and the advisory councils help to keep the NLECTC system attentive to technological priorities and the needs of law enforcement and corrections. They help to link the end user with the developer to create technologies that adequately meet operational requirements and establish which potential technologies should be pursued for development.

All of the current regional centers have distinctive roles or focus areas, that, in many cases, are aligned with the expertise of host organizations and agencies. The centers are currently operated under cooperative agreements or interagency agreements with host organizations and agencies whose employees staff the centers.

To receive more information or to add your name to the NLECTC mailing list, call 800–248–2742 or 301–519–5060, or write:

National Law Enforcement and Corrections Technology Center
2277 Research Boulevard
Mail Stop 8J
Rockville, MD 20850
E-mail: *asknlectc@nlectc.org*
World Wide Web address: *http://www.justnet.org*

The following is a list of NLECTC regional and affiliated facilities that assist NIJ in fulfilling its mission.

Communications Technologies Center of Excellence
200 Federal St., Suite 300
Camden, NJ 08103
(p) (866) 493-4675
E-mail: bregli@commtechcoe.org

Forensic Science Center of Excellence
7881 114th Ave., North
Largo, FL 33773
(p) (727) 549-6067
E-mail: info@biometricgroup.com

Sensors, Surveillance and Biometric Technologies Center of Excellence
One Battery Park Plaza
New York, NY 10004
(p) (888) 424-8424
E-mail: raj@bimetricgroup.com

Weapons and Protective Systems Technologies Center of Excellence
P.O. Box 30
University Park, PA 16804-0030
(p) (814) 865-7098
E-mail: Afm126@psu.edu

NLECTC–Northeast
26 Electronic Parkway
Rome, NY 13441-4514
(p) (888) 338-0584
(f) (315) 330-4315
E-mail: *nlectc_ne@rl.af.mil*

NLECTC–Northwest
6411 A St., Suite 200
Anchorage, AK 99518–1824
(p) (866) 569-2969
(f) (907) 569-6939
E-mail: *nlectc_nw@ctsc.net*

NLECTC–Rocky Mountain
2050 East Iliff Ave.
Denver, CO 80208
(p) (800) 416-8086
(f) (303) 871-2500
E-mail: *nlectc@du.edu*

NLECTC-Southeast
5300 International Blvd.
North Charleston, SC 29418
(p) (800) 292-4385
(f) (843) 760-4611
E-mail: *nlectc-se@nlectc-se.org*

NLECTC–West
c/o The Aerospace Corporation
2350 East El Segundo Blvd.
El Segundo, CA 90245-4691
(p) (888) 548-1618
(f) (310) 336-2227
E-mail: *nlectc@law-west.org*

Border Research and Technology Center
c/o The Sheriffs' Association of Texas
1601 South I–35
Austin, TX 78741
(p) (512) 445-2316
(f) (512) 445-0228
E-mail: *brtc@txsheriffs.org*

Border Research and Technology Center–Western Operations
c/o SDSU Research Foundation
5178 College Ave., Suite 10
San Diego, CA 92115
(p) (888) 656-2782
(f) (888) 660-2782
E-mail: *brtcwestops@sbcglobal.net*

Rural Law Enforcement Technology Center
101 Bulldog Lane
Hazard, KY 41701
(p) (866) 787-2553
(f) (606) 436-6758
E-mail: *ruletc@aol.com*

Office of Law Enforcement Standards
100 Bureau Drive, Stop 8102
Gaithersburg, MD 20899-8102
(p) (301) 975-2757
(f) (301) 948-0978
E-mail: *oles@nist.gov*

About the Office of Law Enforcement Standards

The Office of Law Enforcement Standards (OLES) was established as a matrix management organization in 1971 through a Memorandum of Understanding between the U.S. Departments of Justice and Commerce based on the recommendations of the President's Commission on Crime. OLES's mission is to apply science and technology to the needs of the criminal justice community, including law enforcement, corrections, forensic science, and the fire service. While its major objective is to develop minimum performance standards, which are promulgated as voluntary national standards, OLES also undertakes studies leading to the publication of technical reports and user guides.

The areas of research investigated by OLES include clothing, communication systems, emergency equipment, investigative aids, protective equipment, security systems, vehicles, weapons, and analytical techniques and standard reference materials used by the forensic science community. The composition of OLES' projects varies depending on priorities of the criminal justice community at any given time and, as necessary, draws on the resources of the National Institute of Standards and Technology.

OLES assists law enforcement and criminal justice agencies in acquiring, on a cost-effective basis, the high-quality resources they need to do their jobs. To accomplish this, OLES:

- Develops methods for testing equipment performance and examining evidentiary materials.
- Develops standards for equipment and operating procedures.
- Develops standard reference materials.
- Performs other scientific and engineering research as required.

Since the program began in 1971, OLES has coordinated the development of nearly 200 standards, user guides and advisory reports. Topics range from performance parameters of police patrol vehicles, to performance reports on various speed-measuring devices, to soft body armor testing, to analytical procedures for developing DNA profiles.

The application of technology to enhance the efficiency and effectiveness of the criminal justice community continues to increase. The proper adoption of the products resulting from emerging technologies and the assessment of equipment performance, systems, methodologies etc., used by criminal justice practitioners constitute critical issues having safety and legal ramifications. The consequences of inadequate equipment performance or inadequate test methods can range from inconvenient to catastrophic. In addition, these deficiencies can adversely affect the general population when they increase public safety costs, preclude arrest, or result in evidence found to be inadmissible in court.

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